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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

1911.

Mo. Bot. Garden
1912

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* By a Printers' error this Appendix was paged in continuation of the List of New Garden Plants of the year 1909, instead of in continuation of Appendix II. There are therefore no pages 53–86.

Errata.

Page 138, line 13 from top, transfer 1000 m. from after *Seiner*, to after Kwebe Hills.

Page 168, line 6 from bottom, *for* Verleptcraam *read* Verleptpraam.
Page 275, line 12 from bottom, *for* University *read* College.
Page 276, line 21 from top, *for* 5,000 *read* 500.
Page 299, line 3 from top, *for* dipositi *read* dispositi.
Page 300, line 6 from top *for* superne *read* inferne.
Page 302, line 8 from bottom *for* 9, v. read *q. v.*
Page 354, line 19 from bottom, *for* longii exsiccat, *read* longi, exsiccati.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 1.] [1911.

I.—CONTRIBUTIONS TO THE FLORA OF SIAM.

I.—Sketch of the Vegetation of Chiengmai.

A. F. G. Kerr.

Chiengmai, the capital of Northern Siam, lies about 1000 ft. above sea-level, approximately in Lat. 18° 50′ N., Long. 99° 0′ E., and is situated on the banks of the Meh Ping, which here traverses a valley nearly 120 miles long but not more than 20 or 30 miles at its broadest, reaching from the Chieng Dao gorge in the north to the Meh Ping rapids in the south. This valley, an alluvial plain almost wholly under rice cultivation, is bounded on the east by the mountains of the Meh Ping—Meh Wang watershed, and on the west by those of the Salween—Meh Ping watershed. The mountains on the west are the higher, among them being Doi Intanon, which reaches a height of 8400 ft. and is the highest mountain in Siam, and Doi Sootep 5500 ft.

Doi Sootep, with whose vegetation I will chiefly deal, is composed of metamorphic rock, overlain in most places by red clay. It stands more to the east than the general line of the range, but is not actually isolated, and has two peaks, both practically the same height, and about a mile apart, the ridge connecting them dropping about 500 or 600 ft.

Chiengmai lies somewhat to the north and a good deal to the west of the centre of this valley, about two miles from the foot of Doi Sootep.

Climate.

The year may be divided into three seasons: a hot season lasting from the middle of February to the middle of May, a rainy season from the middle of May to the end of October, and a cold

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season from November to the middle of February. The following table gives the main meteorological features for the year :—

Meteorological Record taken at Chiengmai.

April, 1909–March, 1910.

Temperatures, Fahr.	1909.									1910.		
	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Mean Shade	87·02	86·39	86·09	83·12	83·95	83·21	83·67	76·25	71·95	74·21	76·20	78·81
Mean Daily Range.	33·35	24·67	22·52	20·40	21·45	20·68	22·32	20·31	32·90	36·76	36·48	32·55
HighestShade	108·8	107·5	103·0	104·5	104·0	102·5	102·0	93·0	93·0	96·0	100·5	103·5
Lowest Shade	67·0	69·0	72·0	69·0	70·0	70·5	70·0	57·0	50·5	46·5	48·5	54·0
Highest Sun	152	152	146	140	142	143	143	138	128	129	141	140
Rainfall in inches.	0·79	4·69	3·29	14·60	9·94	10·33	7·71	2·31	0	0	0·03	3·91
Number of days on which rain fell.	10	19	16	24	23	19	14	7	0	0	1	6

Mean Shade Temperature for the year ... 89·91° F.
Total Rainfall for the year ... ... 57·628 inches.

The Mean Shade Temperatures are calculated from the maxima and minima only.

So far I have a meteorological record for one year only, which is, on the whole, a fairly average one with the exception of the rainfall, which was unusually large in the hot season of this year. Owing to the kindness of the Borneo Company, Ltd., Chiengmai, I am enabled to give the average monthly rainfall for the nine years 1901–1909 :—

January–April	...	...	...	1·701 inches.
May	...	...	...	6·809 ,,
June	...	...	...	5·638 ,,
July	...	...	...	7·397 ,,
August	...	...	...	9·862 ,,
September	...	...	...	10·191 ,,
October	...	...	...	7·351 ,,
November	...	...	...	1·994 ,,
December	...	...	...	·342 ,,
Average yearly rainfall		...		51·285 ,,

The temperature at higher altitudes on the mountains is very much cooler than at Chiengmai, and I think it probable that, at and near the top of Doi Sootep, frosts are not uncommon in the cold season. On the same range, but about 50 miles south of Chiengmai, at an altitude of about 3000 ft., I myself experienced a sharp frost one night in January.

Character of the Vegetation.

I propose to limit my remarks chiefly to the vegetation of Doi Sootep as most of my collecting has been done on that mountain.

Chiengmai itself is surrounded by rice fields, but here and there occur patches, which have either gone out of cultivation, or are not considered worth cultivating. These patches are usually covered with a scrub jungle, consisting for the most part of a small thorny bamboo, bushes of *Capparis tenera* and *Zizyphus Jujuba*, with scattered trees of *Butea frondosa*, *Bombax malabaricum* and *Acacia Catechu*. In the rains these bushes are frequently covered with climbers, various species of *Cissus* (*C. adnata*, *C. assamica*, *C. Kerrii*), *Dioscorea*, and several of the *Cucurbitaceae*.

There is a fringe of this scrub jungle in many places at the foot of Doi Sootep; passing through it one enters a mixed jungle of medium-sized trees. This jungle is composed partly of deciduous and partly of evergreen trees, the soil being, as a rule, loam, and the ground fairly level. There is a well developed undergrowth of herbaceous plants and shrubs, several woody climbers find support on the trees, and there are a few epiphytes. Among the trees characteristic of this jungle may be mentioned Teak, *Protium serratum*, *Eugenia fruticosa*, *Schleichera trijuga*, *Casearia Kerrii*, *Irvingia malayana*, *Pterospermum semisagittatum*, and *Shorea floribunda*. The teak trees grow to no great height here, and are usually misshapen, probably owing to unsuitable soil, or to the constant hacking of passing natives. Most of the shrubs produce only annual shoots from a woody rootstock, the fires of the dry season preventing any further development; such are *Brucea sumatrana*, *Desmodium longipes*, *Clerodendron serratum* and *Hibiscus cancellatus*. *Aganosma marginata*, *Celastrus paniculata*, *Acacia pennata*, *Calycopteris floribunda* and *Harrisonia Bennettii* are the chief woody climbers. A plentiful growth of herbaceous plants comes up in the rains, including several ground orchids, *Habenaria Helferi*, *Peristylus constrictus* and two or three species of *Pogonia*, and many other plants such as *Zingiber Zerumbet*, *Clerodendron diversifolia* and *Inula polygonata*.

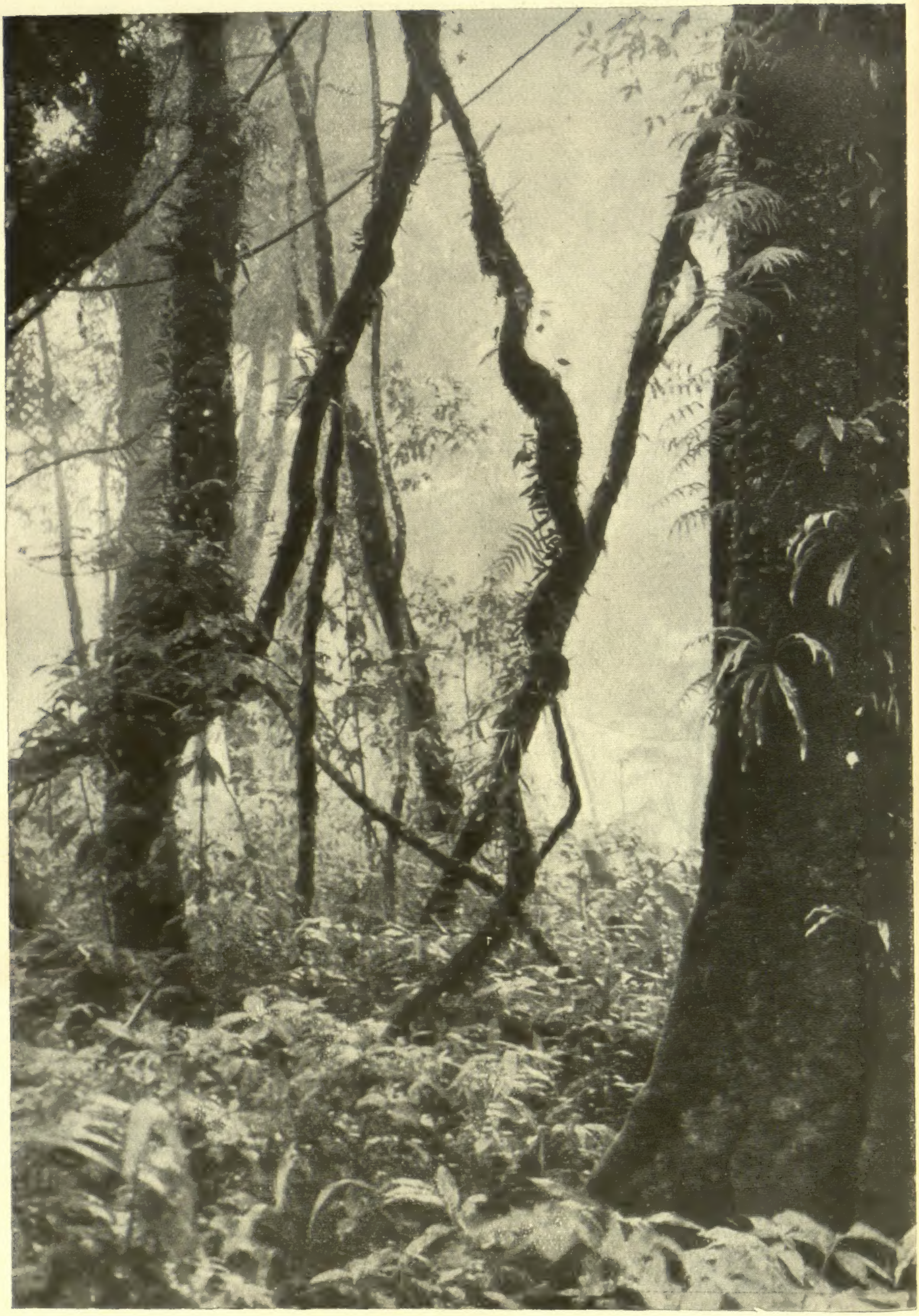
This jungle extends to the foot of the first steep slope, where it gives place to the deciduous jungle known in this country as "Pah Paa" and in Burma as "Eng Jungle." The pah paa extends up the mountain to an altitude of about 2000 ft.; its characteristic trees belong to the *Dipterocarpaceae*, the prevailing species varying with the nature of the soil, and the slope of the ground. There are certain features common to the different forms of pah paa. The jungle is open, the ground being either bare and stony, or covered with a tufty growth of grass; epiphytes abound, but there are few or no woody climbers. Where the ground is very stony the jungle is composed chiefly of stunted trees of *Pentacme siamensis*—75 per cent. of all the trees present may belong to this species. These trees are much infested by such parasites as *Loranthus* and *Viscum*. Occasionally, on somewhat similar ground, *Shorea obtusa* is found as the predominant tree, but intermixed with *Pentacme siamensis*.

On red soil, and particularly where the slope is not very steep, the pah paa has a much greater variety of trees; here *Dipterocarpus tuberculatus* is one of the most noticeable trees and reaches a large size as does also *Dipterocarpus obtusifolius*, and sometimes *Melanorrhoea usitata*, but most of the other trees, such as *Shorea obtusa*, *Quercus Helferiana*, *Buchanania latifolia*, *Diospyros ehretioides*, *Strychnos Nux-vomica*, and many others, are small. Here again most of the shrubs are burnt down to the ground in the hot season, throwing up fresh shoots in the rains, *Ochna Wallichii*, which sometimes grows out into a small tree, *Ellipeia chereevensis*, *Blinkworthia lycioides* and *Clausena excavata* being the commonest. The ground is covered with a tufted growth of grasses and cyperads, amongst which numerous herbaceous plants spring up during the rains. A considerable number of these, belonging to various natural orders, have grass-like leaves and they are nearly all perennials with tuberous roots, annuals being rare. Many have conspicuous flowers such as the orchids *Spathoglottis pubescens* and *Eulophia graminea*, the pretty blue iris (*I. Collettii*), whose flowers open in the afternoon, *Curcuma sessilis*, *Crotalaria neriifolia*, *Barleria cristata*, *Vernonia teres*, and *Striga Masuria*. Epiphytes are abundant; particularly noticeable is the curious *Dischidia Rafflesiana* with its clusters of pitcher leaves, which are not, by the way, used for storing water, forming extensive growths on *Dipterocarpus tuberculatus*. Other common epiphytes are a species of *Hoya*, and numerous orchids—of which *Dendrobium secundum*, *Dendrobium Draconis*, *Eria Griffithii*, *Aerides multiflorum*, *Bromheadia aporoides* and *Sarcanthus Williamsoni* are among the commonest.

Above 2000 ft., the typical pah paa is succeeded by a jungle with a great variety of trees, many of them lofty, a considerable undergrowth of shrubs and herbs, many woody climbers and numerous epiphytes. This jungle, which might be called an oak jungle from the number of species of *Quercus* and *Castanopsis* occurring in it, is also subject to forest fires, but is not so completely burnt as the jungles below. There is a mixture of deciduous and evergreen trees, the most abundant being several species of *Quercus* and *Castanopsis*, *Gmelina arborea*, *Bauhinia variegata*, *Cassia Fistula*, *Schima Wallichii*, and *Lagerstroemia Balansae*. A number of the trees support such woody climbers as *Dalbergia stipulacea*, *Celastrus paniculata*, *Millettia auriculata*, var. *extensa* and *Hiptage Madablota*. Here also most of the herbs are perennials with tuberous roots, conspicuous being several Scitaminads, *Gagnepainia* sp., *Curcuma* sp. and *Kaempferia rotunda*, flowering towards the end of the dry season, after the fires, their leaves not appearing till the rains. Among other herbs found are *Cynoglossum micranthum*, *Disporum calcaratum*, *Hapaline Benthamiana* and *Eulophia nuda*. The epiphytes are chiefly orchids, many with very fine flowers as *Dendrobium gratiosissimum*, *Dendrobium aggregatum*, the curious little hairy *Dendrobium sessile*, *Coelogyne Rhodeana*, and *Vanda Parishii*. There are also a few epiphytic ferns. This jungle is found in open valleys, and on moderate slopes from about 2000 to 3000 ft. In the narrower valleys and near streams the jungle is more decidedly evergreen

OPEN GRASSY JUNGLE, 5200 ft.

[*To face page* 4.



EVERGREEN JUNGLE, 5400 ft.

To face page 5.]

with such trees as *Talauma Hodgsoni*, *Hopea odorata*, *Garcinia cornea*, *Diospyros* sp. and *Baccaurea sapida*. Here appears *Vanilla siamensis*, which often covers the tree trunks to a height of 50 feet or more with its thick leathery looking leaves, and which is known to the natives as Ploo chang or the elephant's betel vine, and also, though rarely, a curious leafless orchid, *Galeola* sp., of which I have not yet been able to find good flowering material.

Where the slope is steep, and on the tops of the spurs, an open grassy jungle, similar to the pah paa of the lower slopes, is found with *Dipterocarpus obtusifolius* as the predominant tree ; associated with it are several oaks, and a few trees of *Pentacme siamensis* and *Shorea obtusa* growing to a larger size than on the lower slopes, but no *Dipterocarpus tuberculatus*. There are very few woody climbers, but a good many epiphytes, chiefly orchids similar to those found in the pah paa below, with the addition of *Bulbophyllum nigrescens*, and *Saccolabium fragrans*. The soil is usually sand or red clay. At about 3000 ft., the upper limits of this jungle, *Pinus Khasya* is first met with.

Above 3000 ft., and to about 4500 ft., we find the open valleys and moderate slopes clothed with an evergreen jungle, recalling the European backwood in summer, predominant being a lofty tree, *Quercus Junghuhnii*, with a smooth grey lichen-blotched bole, while, to enhance the resemblance, *Hypopitys lanuginosa*, so like the *Hypopitys multiflora* of the English woods, is not uncommon on the humus. The nut of *Quercus Junghuhnii*, called by the Laos "Mäkan Dohey," is eaten and greatly esteemed by the natives. Other trees found here are *Carpinus viminea*, *Rhododendron oxyphyllum* and *Vaccinium exaristatum*. There is a considerable undergrowth of small shrubs, such as *Pithecolobium glomeriflorum* and *Evodia triphylla*, interlaced with *Smilax lanceaefolia* and other weak prickly climbers, large woody climbers being very scarce. There are a few herbs, most of them with inconspicuous flowers, *Arisaema Jacquemontii*, *Vernonia chinensis* and a saprophytic *Aphyllorchis* being the most common. Epiphytes, mostly ferns, are not numerous ; a species of *Cymbidium* is also found. A thick layer of humus covers the ground, and is usually underlain by red clay.

Near streams, and in narrow valleys this type of jungle gives place to a dense evergreen jungle with a great variety of tall trees, very few of which I have been able to collect, numerous climbers, including a *Calamus*, and a dense undergrowth, in which a small palm, a species of *Musa* and tall Scitaminads abound.

At higher altitudes, almost to the summit, 5500 ft., we find again an open grassy jungle on the slopes, and here along the crests of ridges *Pinus Khasya*, growing to a large size, is the most noticeable tree. Most of the associated trees are small, particularly when situated on exposed ridges ; *Pieris ovalifolia*, *Helicia erratica* and a small oak, are the commonest of these trees. We meet with two trees here, *Phyllanthus emblica* and *Anneslea fragrans*, also found in the pah paa of the lower slopes, and at least one herb from that jungle reappears here, *Polygala triphylla*. Scattered among the grass are small shrubs with bright flowers, *Desmodium oblongum* and *Osbeckia*

crinita, and numerous herbaceous plants, many of them belonging to temperate genera and usually with conspicuous flowers, among which *Lilium nepalense*, *Drosera peltata*, whose small white flowers dot the grass in all directions in July, *Sonerila Kerrii*, *Valeriana Hardwickii*, *Swertia pulchella*, and *Paris polyphylla* may be mentioned. There are no woody climbers but many of the trees are loaded with orchids and ferns, the commonest being two species of *Bulbophyllum*, *Cirrhopetalum papillosum*, *Coelogyne siamensis*, *Dendrobium bellatulum* and *Pholidota obovata*.

At or near the top of the mountain, where the ground is fairly level and the humus can collect, we find the most luxuriant vegetation to be seen on the whole of Doi Sootep, every bit of available space being occupied by plant life. The trees, *Pyrenaria camelliaeflora*, *Adinandra integerrima*, *Litsaea salicifolia*, and very many others I have not collected, are of medium size and their stems are clothed, as are the numerous lianes, with epiphytic mosses, ferns, asclepiads, gesnerads, orchids and ericaceous shrubs. The ground beneath is covered with a growth of *Scitamineae* and *Acanthaceae*, while the prickly tangled stems of *Smilax lanceaefolia* and *Rubus Kerrii* make progress difficult and painful. *Agapetes Hosseana*, which forms large nodular woody masses, sometimes as large as a man's head, on the branches of trees, and the beautiful white-flowered *Rhododendron Veitchianum* are the commonest of the epiphytic shrubs. Many of the trees are also burthened with immense masses of the orchid, *Otochilus alba*, other orchids here worthy of mention being *Monomeria barbata*, *Eria barbata*, *Dendrobium bicameratum*, *Dendrobium Falconeri*, and *Dendrobium ochreatum*.

At the actual summit is an area of open jungle covered with tall pampas grass studded with low spreading trees of a species of *Glochidion*. This I believe to be a secondary growth on an old clearing made for survey purposes.

Clearings are frequently made lower down at from 2000 to 3000 ft. for the cultivation of mountain rice. These clearings, known as Hais, are abandoned after one crop has been obtained, and become quickly covered with secondary growth. This growth assumes different types, no doubt controlled by various factors such as soil, slope, neighbouring vegetation, &c. In some places a grass, *Imperata arundinacea*, overspreads the clearings, which may then remain in this condition for years ; this grass, known to the natives as Yah Kah, is cut down yearly, being used for thatching. Frequently the earliest growth is of coarse Composites, *Erigeron linifolium* and *Eupatorium odoratum*. When the latter appears it chokes most of the other vegetation with its tangled impenetrable growth. Many old clearings are covered with an almost pure growth of a small tree, *Trema amboinensis*. A secondary growth of bamboo, common in other districts, is not often seen on Doi Sootep. In time, no doubt, most of these clearings return to the original jungle.

I have attempted to sketch only the leading types of vegetation on Doi Sootep, but many others are to be met with, such as open marshes and evergreen swamps. In many places, too, the types of vegetation I have described are found more or less intermixed.

II. List of Siamese Plants with descriptions of new species.

W. G. Craib.

At the present time the only guide to the Flora of Siam is the list compiled by Dr. Williams and published in Bull. Herb. Boiss. (1904–05), a list which, in view of more recent collections, must be regarded as very incompletely representing the flora of that country. At the time that Dr. Williams was compiling his list Northern Siam was practically unrepresented in the Kew Herbarium, with the result that his list unduly emphasises the Malay Peninsula element in the flora.

Quite recently, however, some very important additions have been made to our botanical knowledge of that part of the country. In 1904–05 Dr. C. C. Hosseus made a large collection of plants, chiefly in N.W. Siam, and a fairly complete set of his plants is preserved in the Kew Herbarium. Lately large collections have been and are still being received at Kew from Dr. A. F. G. Kerr from the same district but mostly from Doi Sootep, a mountain near Chiengmai. Dr. Kerr has the great advantage of being resident in the district—an advantage which can hardly be overestimated when it is remembered that botanically the district is practically unknown. This has enabled Dr. Kerr, who is a keen and careful collector, to forward very complete material to Kew. The officers of the Siamese Forest Service have also commenced the botanical investigation of their districts, as shewn by a small consignment of specimens lately received. It is to be earnestly hoped that the officers concerned may pursue the good work thus begun.

The present list which, it is hoped, may be completed this year, is to be regarded as additional to the list published by Dr. Williams. In order, however, to illustrate as fully as possible Dr. Kerr's introduction, dealing with the botany of his district, all Dr. Kerr's specimens are quoted, whether the species has already appeared in Dr. Williams' list or not. In cases where the species has already been included by Dr. Williams a reference will be found to his list.

Besides the collections already referred to, a small collection made by Mr. D. O. Witt, chiefly in Southern Siam, and several specimens of the older collections which had been overlooked by Dr. Williams have been included.

Chiengmai, in its flora, shows a strong affinity with Upper Burma and Yunnan—as might be expected from its geographical position. Several of the new species described from the Shan States by Collett and Hemsley in Journ. Linn. Soc., vol. xxviii., *e.g.* *Phylacium majus*, *Lonicera Hildebrandiana*, &c., have been collected by Dr. Kerr, and again a large collection from Burma made by Mr. J. H. Lace includes *Grewia Lacei*, *Modecca pinnatisecta*, *Lagerstroemia Collettii*, *Osbeckia rostrata*, &c., species which were originally described for the present paper from Dr. Kerr's specimens.

Throughout the list references have been given to Hooker's Flora of British India (contracted F.B.I.), to Kurz's Forest Flora of

Burma (contracted For. Fl. Burma), and to Collett and Hemsley's paper on the Flora of the Shan States published in the Journal of the Linnean Society. References have also been given to Lecomte's Flore Generale de l'Indo-Chine so far as that work has been published (contracted Fl. Indo-Chine), and to various other papers which serve in the writer's opinion to throw light on the species under consideration.

The distribution of the species is taken, except when otherwise stated, from specimens in the Kew Herbarium. Several species are quoted, of which no specimens from Siam have been seen, but in such cases the authority for the record is alone quoted.

The sequence of Bentham and Hooker's Genera Plantarum is followed on the whole and the species are arranged alphabetically under the genera.

As Dr. Kerr is still forwarding large collections the present instalment, which deals with the Polypetalae, includes the specimens received at Kew up to the end of the year 1910.

New species which have already been published are denoted by an asterisk (*).

The Lao names, except when otherwise stated, are taken from Dr. Kerr's notes.

POLYPETALAE.

Ranunculaceae.

Clematis smilacifolia, *Wall.*—F.B.I., i. p. 3; For. Fl. Burma, i. p. 16; Williams, Bull. Herb. Boiss., v. (1905) p. 22; Fl. Indo-Chine, i. p. 3.

Chiengmai, Doi Sootep, 500–700 m., *Hosseus*, 297.

Distr. India, China, Tonkin, Malaya.

Dilleniaceae.

Tetracera sarmentosa, *Vahl*, var. **Loureiri**, *Finet et Gagnep.*—Fl. Indo-Chine, i. p. 16.

Bangkok, *Zimmermann*, 74.

Distr. (of var.). Cambodia, Cochinchina, Malay Peninsula.

Dillenia Kerrii, *Craib*, sp. n., ab affini *D. scabrella*, Roxb., floribus majoribus, pedicellis brevioribus facile distinguenda.

Arbor decidua, ramulis crassis primo breviter appresse fulvo-pubescentibus mox glabris. *Folia* elliptica, utrinque rotundata sed basi rarissime inaequalia cuneata, 28·5–30 cm. longa, 14·2–17·2 cm. lata, chartacea vel subcoriacea, supra nervis nervulisque pilis brevibus rigidiusculis parce instructa, subtus costa nervisque primariis fulvo-pilosa, nervulis ut in pagina superiore, nervis lateralibus utrinque ultra 40 ad marginem simplicibus inter se 5–7 mm. distantibus, cum costa supra conspicuis subtus prominentibus nervis transversis subtus prominulis, margine nervis excurrentibus denticulata; petioli 4·5–6·5 cm. longi, supra valde canaliculati, basi dilatati, ut in costa appresse fulvo-pubescentes. *Flores* mane expansi (*ex Kerr*), plerumque gemini, ramulis brevissimis ligno anni praeteriti exoreuntes; pedicelli 1·5–2·5 cm. longi, crassiusculi, densius puberuli, apicem versus bracteola ovato-lanceolata obtusa 9 mm. longa 6 mm. lata instructi. *Sepala* exteriora

maxima, rotundata, circiter 1·4 cm. diametro, interiora late elliptica, 1·7 cm. longa, 1·2 cm. lata, coriacea, ciliata, extus appresse pubescentia, intus glabra margines apicesque versus parce brevissime pilulosa. *Petala* sulphurea (*ex Kerr*), obovata, apice rotundata, basi cuneata vix stipitata vel interdum in unguem distinctum contracta, 2·5–2·6 cm. longa, 1·4–1·5 cm. lata, utrinque glabra, distincte nervata. *Ovarium* e carpellis 6 constitutum, 8 mm. altum, superne appresse albo-pubescens ; styli 8 mm. longi, uncinati, glabri.

Hills between Muang Prow and Chieng Dao, 600 m., in mixed jungle, *Kerr*, 1046.

Distr. Burma, *Kurz*, *Robertson*, 140 ?

The specimen collected by Kurz in Burma was named *D. parviflora*, and it is possible that this plant may be the *D. parviflora*, Kurz, For. Fl. Burma, I. p. 21 *non* Griff. From Griffith's species *D. Kerrii* is readily distinguished by its larger flowers and by the very different shape and indumentum of the sepals.

Dillenia pulcherrima, *Kurz*—F.B.I., i. p. 37 ; For. Fl. Burma, i. p. 19 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 16.

Meh Fang, 360 m., *Kerr*, 1063.

Distr. Burma.

Lao name, Mă San Quang.

Magnoliaceae.

Talauma Hodgsoni, *Hook f. et Th.*—F.B.I., i. p. 40.

Chiengmai, evergreen jungle on Doi Sootep, 660–900 m., *Kerr*, 1098.

Distr. Sikkim, Khasia, Upper Burma.

Lao name, Boon Tah.

Michelia Champaca, *Linn.*—F.B.I., i. p. 42 ; For. Fl. Burma, i. p. 25 ; Williams, Bull. Herb. Boiss., v. (1905) p. 23 ; Fl. Indo-Chine, i. p. 38.

Chiengmai, Doi Sootep, 900–1140 m., *Kerr*, 1279, *Hosseus*, 480.

Distr. India, Yunnan, throughout Indo-China, Malaya.

Lao name, Chum Pi (ex *Kerr*).

Anonaceae.

Uvaria rufa, *Blume*—Williams, Bull. Herb. Boiss., v. (1905) p. 23 ; Fl. Indo-Chine, i. p. 51.

Chiengmai, in scrub jungle at foot of Doi Sootep, 300 m., *Kerr*, 660.

Distr. Cochinchina, Java.

Ellipeia cherrevensis, *Pierre ex Finet et Gagnep.*—Fl. Indo-Chine, i. p. 58.

Chiengmai, in deciduous jungle on Doi Sootep, 300–450 m., *Kerr*, 636—"a few twigs about 45 cm. high from a perennial rootstock."

Distr. Cambodia.

Artabotrys burmanicus, *DC.*—F.B.I., i. p. 55 ; For. Fl. Burma, i. p. 32 ; Fl. Indo-Chine, i. p. 81.

Petchabouri (ex Fl. Indo-Chine, l.c.).

Unona dubia, *Craib*, sp. n., a speciebus ceteris carpellis 4 tantum distincta.

Fruticulus 45 cm. altus (*ex Kerr*); ramuli ad 2·5 mm. diametro, primo tomentelli, demum glabri, cortice rubro-brunneo. *Folia* oblonga, oblanceolata vel oblongo-oblanceolata, apice obtusa vel brevissime obtuse acuminata, basi rotundata vel leviter cordata, 3·6–12·5 cm. longa, 1·5–4·7 cm. lata, supra glabra, subtus molliter pubescentia, rigide chartacea, integra, nervis lateralibus utrinque circiter 8 intra marginem arcuatis supra leviter impressis subtus prominulis; petioli crassiusculi, 3 mm. longi, tomentelli. *Flores* plerumque solitarii, ex axillis veteribus pedicellis brevibus. *Sepala* 3, late deltoidea, 2 mm. longa, fere 2 mm. lata, extra fulvo-tomentella. *Petala* 6, 2-seriata, subaequalia, ovata vel ovato-lanceolata, obtusa, 5–8 mm. longa, 4 mm. lata, extus fulvo-pilulosa, intus glabra. *Stamina* ∞, filamentis productis truncatis antheras obtegentibus. *Carpella* 4, quorum 1 vel 2 tantum maturantia, dense pilosa, ovulis 5–6 uniseriatis. *Fructus* haud semper torulosus, 1–2 cm. longus, 1·3 cm. diametro, stipite 5 mm. longo, tomentellus.

Chiengmai, mixed jungle at foot of Doi Sootep, 330 m., *Kerr*, 1207.

According to Kerr the fruit is edible.

Lao name, Noom Wooa.

The systematic position of this plant is a little doubtful. It agrees with *Unona* in everything but the carpels and would appear to be intermediate between that genus with its many carpels and *Monocarpia* with its solitary carpel.

Unona dumosa, *Roxb.*—F.B.I., i. p. 59; Fl. Indo-Chine, i. p. 60.

Near Chantaboon, *Murton*, 82.

Distr. Assam.

Goniothalamus Griffithii, *Hook. f. et Th.*—F.B.I., i. p. 73; For. Fl. Burma, i. p. 42.

Chiengmai, by streams on Doi Sootep, 660 m., *Kerr*, 1209.

Distr. Burma.

Mitrephora Maingayi, *Hook. f. et Th.*, var. **Kurzii**, *King*. *M. vandaeflora*, Kurz, For. Fl. Burma, i. p. 65.

Doi Saket, Ban Sun Pak Suk, 600 m., *Kerr*, 1024.

Distr. Pegu.

Anomianthus heterocarpus, *Zoll.*—Fl. Indo-Chine, i. p. 46.

Chiengmai, common, 300 m., *Kerr*, 607.

Distr. Indo-China, Java.

Miliusa velutina, *Hook. f. et Th.*—F.B.I., i. p. 87; For. Fl. Burma, i. p. 47; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 17; Fl. Indo-Chine, i. p. 112.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 1078.

Distr. India, Burma, Cochinchina.

Miliusa sp. n. aff. *M. Thorelii*, Finet et Gagnep.

Small dioecious tree—♂ only known, collected by Kerr (1162) on Doi Sootep.

Orophea polycephala, *Pierre*—Fl. Indo-Chine, i. p. 119.

Muong-pran (ex Fl. Indo-Chine l.c.).

Menispermaceae.

Tinospora crispa, *Miers*—F.B.I., i. p. 96; For. Fl. Burma, i. p. 52; Fl. Indo-Chine, i. p. 132.
Ratpura Province (ex Fl. Indo-Chine l.c.).

Limacia velutina, *Miers*—F.B.I., i. p. 100; For. Fl. Burma i. p. 55; Fl. Indo-Chine, i. p. 144.
Near Muong-pran (ex Fl. Indo-Chine, l.c.).

Limacia triandra, *Miers*—F.B.I., i. p. 100; For. Fl. Burma, i. p. 55; Fl. Indo-Chine, i. p. 146.
Petchabouri River (ex Fl. Indo-Chine, l.c.).

Cocculus villosus, *DC.*—F.B.I., i. p. 101; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 17; Fl. Indo-Chine, i. p. 143.
Near Muong-pran (ex Fl. Indo-Chine, l.c.).

Stephania hernandifolia, *Walp.*—F.B.I., i. p. 103; Fl. Indo-Chine, i. p. 147.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 748.
Distr. Asia, Africa, Australia.

Stephania rotunda, *Lour.*—F.B.I., i. p. 103; Fl. Indo-Chine, i. p. 148.
Chiengmai, annual shoots from a large, round, perennial, woody tuber, usually lying on rocks, in evergreen jungle on Doi Sootep, 750 m., *Kerr*, 641.
Distr. India, China, Indo-China, Malaya.

Cissampelos Pareira, *Linn.*—F.B.I., i. p. 104; Fl. Indo-Chine, i. p. 149.
Petchabouri River (ex Fl. Indo-Chine, l.c.).

Pachygone dasycarpa, *Kurz*—For. Fl. Burma, i. p. 56; Fl. Indo-Chine, i. p. 152.
Siam (ex Fl. Indo-Chine, l.c.).

Pachygone nitida, *Pierre ex Gagnep.*—Fl. Indo-Chine, i. p. 153.
Som-reap, (ex Fl. Indo-Chine, l.c.).

Antitaxis nodiflora, *Gagnep.*—Fl. Indo-Chine, i. p. 154.
Muong-pran, Wai Wan (ex Fl. Indo-Chine, l.c.).

Berberidaceae.

Mahonia nepalensis, *DC.* *Berberis nepalensis*, Spreng.—F.B.I., i. p. 109; For. Fl. Burma, i. p. 58; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 17.
Chiengmai, Doi Sootep, 1500–1650 m., *Kerr*, 1107.
Distr. India, Burma, China, Philippines.

Capparidaceae.

Gynandropsis pentaphylla, *DC.*—F.B.I., i. p. 171; Fl. Indo-Chine, i. p. 175.
Bangkok, *Zimmermann*, 4.
Distr. Common in Tropics.

Niebuhria decandra, *Gagnep.*, **var. angustifolia**, *Gagnep.*, Fl. Indo-Chine, i. p. 176.

Muong-pran, (ex Fl. Indo-Chine, l.c.).

Niebuhria siamensis, *Kurz*, For. Fl. Burma, i. p. 59; Fl. Indo-Chine, i. p. 177.

Ratbouri Province, (ex Fl. Indo-Chine, l.c.).

Capparis echinocarpa, *Pierre ex Gagnep.*—Fl. Indo-Chine, i. p. 195.

Petchabouri, *Pierre*, 4016.

Capparis flavicans, *Wall.*—F.B.I. i. p. 179; For. Fl. Burma, i. p. 63; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 19. *C. cambodiana*, Pierre ex Gagnep.—Fl. Indo-Chine, i. p. 194.

Lakon, 300 m., *Kerr*, 1010; Ratbouri, *Teysmann*; Paknampo, *Witt.*

Distr. Burma.

Capparis foetida, *Blume*—Fl. Indo-Chine, i. p. 184.

Paknampo, *Witt*, 6.

Distr. Cochinchina.

Capparis horrida, *Linn. f.*—F.B.I., i. p. 178; For. Fl. Burma, i. p. 62; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 21; Fl. Indo-Chine, i. p. 185.

Meh Ngat, 420 m., *Kerr*, 1035.

Distr. India, Burma, Malaya, Philippines.

Capparis micrantha, *DC.*—F.B.I., i. p. 179; For. Fl. Burma, i. p. 61; Fl. Indo-Chine, i. p. 186. ? *C. roydsiaefolia*, Kurz, For. Fl. Burma, i. p. 61. *C. sp.*, Williams, Bull. Herb. Boiss. v. (1905) p. 24. p.p.

Paknampo, *Witt* 3, 4; Bangkok, *Zimmermann*, 63, *Schomburgk*, 107.

Distr. Burma, Malaya, Philippines.

Capparis sepiaria, *Linn.*—F.B.I., i. p. 177; For. Fl. Burma, i. p. 66; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 21: Fl. Indo-Chine, i. p. 191.

Chiengmai, mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 609.

Distr. India, Malaya, Philippines.

Capparis siamensis, *Kurz*, For. Fl. Burma, i. p. 63; Williams, Bull. Herb. Boiss., v. (1905) p. 24; Fl. Indo-Chine, i. p. 195.

Ratbouri, *Teysmann*, 5927 in Hb. Kurz; Paknampo, *Witt*, 1.

Capparis tenera, *Dalz.*, var. **latifolia,** *Hook. f. et Th.*, F.B.I., i. p. 179. *C. disticha*, Kurz, Journ. As. Soc. Beng., xliii. p. 69.

Chiengmai, scandent among bamboo clumps on banks of Meh Ping, 300 m., *Kerr*, 606.

Distr. Pegu, Rangoon.

Capparis Thorelii, *Gagnep.*, var. **pranensis,** *Gagnep.*—Fl. Indo-Chine, i. p. 190.

Muong-pran, *Pierre*, 4018.

Crataeva Narvala, *Ham.* *C. religiosa*, Forst., var. *Nurvala*, Hook. f. et Th., F.B.I., i. p. 172. *C. religiosa*, Forst., var. *Narvala*, Fl. Indo-Chine, i. p. 178.

Phre, Hooey Kamin, 180 m., *Kerr*, 989.

Distr. India, Indo-China, Malaya.

Lao name, Mai Fuk Koom (ex *Kerr*).

Violaceae.

Viola serpens, *Wall.*—F.B.I., i. p. 184 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 22.

Chiengmai, Doi Sootep, 1200–1500 m., *Kerr*, 518, 518a ; 1700 m., *Hosseus*, 190.

Distr. India, China, Burma, Java.

***Alsodeia Murtonii,** *Craib*, Kew Bull. 1910 p. 275. *A. macrophylla*, Williams, Bull. Herb. Boiss., v. (1905) p. 24. p.p. ; Fl. Indo-Chine i. p. 217, p.p. *non* Decne.

Koh Klone, *Murton*, 15.

Alsodeia sp., *Craib*, Kew Bull. 1910 p. 275 in nota. *A. macrophylla*, Williams, Bull. Herb. Boiss. v. (1905) p. 275, p.p. ; Fl. Indo-Chine, i. p. 217, p.p. *non* Decne.

Chantaboon, *Murton*, 72.

Closely related to *A. membranacea*, King, a native of Perak.

Scyphellandra Pierrei, *H. de Boissien*—Fl. Indo-Chine, i. p. 218, cum tab.

Near Chantaboon, *Murton*, 84 ; Doi Chieng Dao, 420 m., *Hosseus*, 465.

Distr. Cochinchina.

Bixaceae.

Flacourtia Thorelii, *Gagnep.*—Fl. Indo-Chine, i. p. 236, var. ?

Chiengmai, Doi Sootep, 600–900 m., *Kerr*, 562 (♂) ; Ban Meh Tah, 450 m., *Kerr*, 562a (♀).

Distr. Nong-kay.

This species is represented in Herb. Kew by female specimens only. Kerr's 562a agrees with these, but 562 differs from the description in having the filaments glabrous.

Taraktogenos serrata, *Pierre ex Gagnep.*—Fl. Indo-Chine, i. p. 225.

Muong-pran (ex Fl. Indo-Chine l.c.).

Polygalaceae.

Salomonia cantoniensis, *Lour.*—F.B.I., i. p. 206 ; Fl. Indo-Chine, i. p. 250.

Chiengmai, Doi Sootep, 360 m., *Kerr*, 1335.

Distr. S.E. Asia.

Salomonia longiciliata, *Kurz*—Fl. Indo-Chine, i. p. 251, cum tab.

Wang Djao, *Hosseus*, 121.

Distr. Pegu.

Polygala longifolia, *Poir.*—Chodat, Monog. Polygal., ii. p. 358 ; Fl. Indo-Chine, i. p. 257. *P. leptalea*, DC.—F.B.I., i. p. 202, p.p. ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 22.

Chiengmai, in eng jungle on Doi Sootep, 300–600 m., *Kerr*, 755.

Distr. India, Burma, N.E. Australia.

Polygala persicariaefolia, *DC.*—F.B.I., i. p. 202.

Chiengmai, among grass on Doi Sootep, 1500 m., *Kerr*, 887.

Distr. India, Burma, Assam, Yunnan, Trop. Africa.

Polygala tricholopha, *Chodat*, Monog. Polygal., ii. p. 98. *P. arillata*, Ham.—F.B.I., i. p. 200, p.p.

Chiengmai, scandent in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 700.

Distr. Nepaul, Khasia.

Polygala triphylla, *Ham.*, var. **glaucescens,** *A. W. Benn.*, F.B.I., i. p. 201 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 23.

Chiengmai, among grass on Doi Sootep, 1500 m., *Kerr* 777, 886 ; Wang Djao, *Hosseus*, 55.

Distr. India, China, Burma, Malay Peninsula.

P. cardiocarpa, Kurz, which is not represented in Herb. Kew must be closely allied to this plant. According to Fl. Indo-Chine *P. cardiocarpa* does occur in Indo-China, whereas *P. glaucescens* is not mentioned in that Flora.

Xanthophyllum flavescens, *Roxb.*, var. **virens,** *A. W. Benn.*, F.B.I., i. p. 209. *X. virens*, Roxb.—For. Fl. Burma, i. p. 81.

Muang Prow, Meh Ngat, 480 m., *Kerr*, 1038.

Distr. Burma, Assam.

Caryophyllaceae.

Brachystemma calycinum, *Don*—F.B.I., i. p. 235 ; Fl. Indo-Chine, i. p. 265.

Doi Chieng Dao, 400 m., *Hosseus*, 470.

Distr. Nepaul to Yunnan.

Polycarpaea corymbosa, *Lamk.*—F.B.I., i. p. 245 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 24 ; Fl. Indo-Chine, i. p. 267.

Kan Phra Dang, *Hosseus*, 158.

Distr. India, China, Burma.

Hypericaceae.

Hypericum japonicum, *Thunb.*—F.B.I., i. p. 256 ; For. Fl. Burma, i. p. 83 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 24 ; Fl. Indo-Chine, i. p. 286.

Chiengmai, on Doi Sootep, 700 m., *Hosseus*, 485.

Distr. India, Burma, China, Japan, Malaya, Australia, New Zealand.

Cratoxylon polyanthum, *Korth.*—F.B.I., i. p. 257 ; For. Fl. Burma, i. p. 84 ; Williams, Bull. Herb. Boiss., v. (1905) p. 25.

Chiengmai, Doi Sootep, 390 m., *Kerr*, 1080.

Distr. Throughout Indo-China, China, Malaya, Philippines.

Cratoxylon prunifolium, *Dyer*, F.B.I., i. p. 258 ; Fl. Indo-Chine, i. p. 289. *C. pruniflorum*, Kurz, For. Fl. Burma, i. p. 84.

Chiengmai, deciduous jungle on lower slopes of Doi Sootep, 300–600 m., *Kerr*, 611.

Distr. Burma, Yunnan, Cambodia.

Guttiferae.

Garcinia cornea, *Linn.*—F.B.I., i. p. 260 ; For. Fl. Burma, i. p. 88.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1073 ♂ : Meh Kung, 420 m., *Kerr*, 1020 ♀.

Distr. India, Burma, Malaya.

Garcinia Cowa, *Roxb.*—F.B.I., i. p. 262 p.p.; For. Fl. Burma, i. p. 90.
Chiengmai, Doi Sootep, 900 m., *Kerr*, 1124.
Distr. Bengal, Burma, Assam, Yunnan.

Garcinia merguensis, *Wight*—F.B.I., i. p. 267; For. Fl. Burma, i. p. 89; Fl. Indo-Chine, i. p. 299.
Chiengmai, Doi Sootep, 600 m., *Kerr*, 1135 ♀, 1139 ♂.
Distr. Burma, Malacca, Cambodia.

Garcinia Schomburgkiana, *Pierre*—Fl. Indo-Chine, i. p. 312: *non* Williams, Bull. Herb. Boiss., v. (1905) p. 25.
Siam, *Schomburgk*, sine num.

Garcinia Xanthochymus, *Hook. f. ex T. And.*, F.B.I., i. p. 269; For. Fl. Burma, i. p. 93; Williams, Bull. Herb. Boiss., v. (1905) p. 25.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1201.
Distr. India (often cultivated).
Lao name, Mai Dah.

Ochrocarpus siamensis, *T. And.*, F.B.I., i. p. 270; For. Fl. Burma, i. p. 94; Fl. Indo-Chine, i. p. 293; Williams, Bull. Herb. Boiss., v. (1905) p. 25.
Chiengmai, on lower slopes of Doi Sootep, 300–450 m., *Kerr*, 548.
Distr. Burma, Cambodia, Cochinchina.
Lao name, Sălup Pi.

Calophyllum Inophyllum, *Linn.*—F.B.I., i. p. 273; For. Fl. Burma, i. p. 95; Fl. Indo-Chine, i. p. 324; Williams, Bull. Herb. Boiss. v. (1905) p. 25. *Garcinia Schomburgkiana*, Williams, Bull. Herb. Boiss., v. (1905) p. 25, *non* Pierre.
Bangkok, *Schomburgk*, 151.
Distr. India, Burma, China, Cochinchina, Malaya.

Mesua ferrea, *Linn.*—F.B.I., i. p. 277; For. Fl. Burma, i. p. 97; Fl. Indo-Chine, i. p. 328; Williams, Bull. Herb. Boiss., v. (1905) p. 25.
Chiengmai, cultivated, 300 m., *Kerr*, 1211; Bangkok, *Zimmermann*, 110.
Distr. Throughout India, Indo-China, Malaya—often cultivated.

Ternstroemiaceae.

Anneslea fragrans, *Linn.*—F.B.I., i. p. 280; For. Fl. Burma, i. p. 98; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 25; Williams, Bull. Herb. Boiss., v. (1905) p. 25; Fl. Indo-Chine, i. p. 335.
Chiengmai, Doi Sootep, 1350–1650 m., *Kerr*, 509, *Hosseus*, 216.
Distr. Burma.

Ternstroemia japonica, *Thunb.*—F.B.I., i. p. 281; For. Fl. Burma, i. p. 99; Fl. Indo-Chine, i. p. 332.
Chiengmai, Doi Sootep, 1500 m., *Kerr*, 1307 (♀), 900 m., *Kerr*, 1257 (♂).
Distr. India, Burma, China, Japan, Cambodia, Cochinchina.

Adinandra integerrima, *T. And. ex Dyer*, F.B.I., i. p. 282; Fl. Indo-Chine, i. p. 334.
Chiengmai, Doi Sootep, 900 m., *Kerr*, 1156.
Distr. Yunnan, Cambodia, Malay Peninsula.

Eurya acuminata, *DC.*, var. **Wallichiana**, *Dyer*, F.B.I., i. p. 285.
Chiengmai, in evergreen jungle on Doi Sootep, 1350–1500 m., *Kerr*, 875.
Distr. India, Burma, China, Malaya.

Eurya japonica, *Thunb.*, var. **nitida**, *Dyer*, F.B.I., i. p. 284 ; Fl. Indo-Chine, i. p. 338.
Chiengmai, Doi Sootep, 1500–1700 m., *Kerr*, 510, *Hosseus*, 181, 183.
Distr. India, Cochinchina, Tonkin, Cambodia, Malay Archipelago.

Saurauja Roxburghii, *Wall.*—F.B.I., i. p. 287 ; For. Fl. Burma, i. p. 103 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 25 ; Fl. Indo-Chine, i. p. 26.
Chiengmai, in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 686.
Distr. E. India.

Schima Wallichii, *Chois.*—F.B.I., i. p. 289 ; For. Fl. Burma, i. p. 106 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 25 ; Fl. Indo-Chine, i. p. 350.
Chiengmai, Doi Sootep, 660–1350 m., *Kerr*, 1083.
Distr. India, Burma, Yunnan.
Lao name, Měh Tŭh Loh.

Pyrenaria camelliæflora, *Kurz*, var. ?
Chiengmai, Doi Sootep, 1350–1650 m., *Kerr*, 1102.
Differs from *P. camelliæflora*, chiefly in the slightly larger flowers.

Camellia drupifera, *Lour.*—F.B.I., i. p. 293 ; For. Fl. Burma, i. p. 109.
Chiengmai, Doi Sootep, 1200–1700 m., *Kerr*, 889, *Hosseus*, 180.
Distr. India, Burma, China.

Dipterocarpaceae.

Dipterocarpus alatus, *Roxb.*—F.B.I., i. p. 298, excl. syn. *D. costatus*; For. Fl. Burma, i. p. 116 ; Brandis, Journ. Linn. Soc., xxxi. p. 34 ; Fl. Indo-Chine, i. p. 362 ; Williams, Bull. Herb. Boiss., v. (1905) p. 26.
Chiengmai plain, 300 m., *Kerr*, 532.
Distr. Burma.

Dipterocarpus costatus, *Gaertn.*—For. Fl. Burma, i. p. 117 ; Brandis, Journ. Linn. Soc., xxxi. p. 35. *D. alatus*, Dyer, F.B.I., i. p. 298 p. p.
Chiengmai, in evergreen jungle on Doi Sootep, 600–(? 1500) m., *Kerr*, 1067.
A portion of Kerr's 1067 was sent to Calcutta Herbarium, and was compared with the material there by Mr. W. W. Smith, who remarks that it agrees well with the Burmese specimens referred to *D. costatus* by the late Sir George King. Through lack of material, Dyer, in the Flora of British India, l.c., reduced this species to *D. alatus*, and Brandis, for the same reason, while enumerating it as a distinct species, seems to indicate that it is not

a very satisfactory species. The receipt of good material shows, however, that it is a well-marked species, and quite distinct from *D. alatus*.

Distr. Chittagong (*fide Smith in litt.*), Burma, *Robertson*, 118, *Brandis* in Herb. Kurz.

Dipterocarpus intricatus, *Dyer*—Brandis, Journ. Linn. Soc., xxxi. p. 39 ; Fl. Indo-Chine, i. p. 360.

Korat, 60–90 m., *Witt.*

Distr. Cambodia, Cochinchina.

Vern. Mai Krat (ex *Witt*).

Dipterocarpus obtusifolius, *Teysm.*—F.B.I., i. p. 295; For. Fl. Burma, i. p. 115 ; Brandis, Journ. Linn. Soc., xxxi. p. 27 ; Fl. Indo-Chine, i. p. 358 ; Williams, Bull. Herb. Boiss., v. (1905) p. 26.

Chiengmai, Doi Sootep, 300–900 m., *Kerr*, 931, *Hosseus*, 298 ; *Teysmann*, 5918 Herb. Bog. sine loc.

Distr. Burma.

Lao name, Mai Hieng (ex *Kerr*).

Dipterocarpus tuberculatus, *Roxb.*—F.B.I., i. p. 297 ; For. Fl. Burma, i. p. 113 ; Brandis, Journ. Linn. Soc., xxxi. p. 32 ; Fl. Indo-Chine, i. p. 361 ; Williams, Bull. Herb. Boiss., v. (1905) p. 26.

Chiengmai, on lower slopes of Doi Sootep, 300–450 m., *Kerr*, 1066 ; Korat, 60–90 m., *Witt* ; *Teysmann*, 5932 in Herb. Bog. sine loc.

Distr. Burma, Cochinchina.

Lao name, Mai Tüng (ex *Kerr*).

Dipterocarpus turbinatus, *Gaertn.*—F.B.I., i. p. 295 e. p. ; Brandis, Journ. Linn. Soc., xxxi. p. 27. *D. laevis*, Ham.—For. Fl. Burma, i. p. 114.

Chiengmai, Doi Sootep, 600 m., *Kerr*, 1152.

Distr. Assam, Burma, Malacca.

Shorea floribunda, *Kurz*—F.B.I., i. p. 304 ; For. Fl. Burma, i. p. 119 ; Brandis, Journ. Linn. Soc., xxxi. p. 85.

Chiengmai, Doi Sootep, 300–800 m., *Kerr*, 527, 567, *Hosseus*, 427.

Distr. Burma.

Lao name, Kun Gaum (ex *Kerr*).

Shorea obtusa, *Wall.*—F.B.I., i. p. 306 ; For. Fl. Burma, i. p. 118 ; Brandis, Journ. Linn. Soc., xxxi. p. 80 ; Fl. Indo-Chine, i. p. 378.

Chiengmai, lower slopes of Doi Sootep, 300–600 m., *Kerr*, 549.

Distr. Throughout Indo-China, East India.

Lao name, Mai Ngaa.

Hopea odorata, *Roxb.*—F.B.I., i. p. 308 ; For. Fl. Burma, i. p. 120 ; Brandis, Journ. Linn. Soc., xxxi. p. 59 ; Fl. Indo-Chine, i. p. 373.

Chiengmai, Doi Sootep, 300–750 m., *Kerr*, 1099 ; Muang Win, 420–450 m., *Nisbet*, 1069 in Herb. Kerr ; Bangkok, *Zimmermann*, 103 ; Lem Tong Lan, *Murton*, 121.

Distr. General in Indo-China, Andaman Is., Borneo.

Lao name, Mai Takien (ex *Kerr*).

Murton, 121 is referable to var. *eglandulosa*, Pierre.

Pentacme siamensis, *Kurz*, For. Fl. Burma, i. p. 119 ; Fl. Indo-Chine, i. p. 385. *Shorea siamensis*, Miq.—F.B.I., i. p. 304 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 25.

Var. β **suavis**, *Pierre*—Fl. Indo-Chine, l.c.
Chiengmai, Doi Sootep, 300–750 m., *Kerr*, 556 e.p.
Var. γ **mekongensis**, *Pierre*—Fl. Indo-Chine, l.c.
Chiengmai, Doi Sootep, 400–800 m., *Kerr*, 556 e.p., *Hosseus*, 477.
Distr. Burma.
Lao name, Mai Pow.

From Dr. Kerr's notes it appears that there is a glabrous and a pubescent form of *Dipterocarpus tuberculatus* and of *D. obtusifolius* as well as of *Pentacme siamensis*. These two forms of each of the three species are recognised by the natives as distinct, *e.g.*, the glabrous and pubescent forms of *D. tuberculatus* are known to them as the red and the white Mai Tüng. Dr. Kerr has so far been unable to collect a complete set of specimens showing these various forms owing to the scarcity of some of them near Chiengmai, *e.g.*, the glabrous form of *D. tuberculatus* is the common form on Doi Sootep where the pubescent form is rather rare.

Malvaceae.

Wissadula zeylanica, *Medik.*—Fl. Indo-Chine, i. p. 410. *W. rostrata*, Planch.—F.B.I., i. p. 325.
Lakon, 300 m., *Kerr*, 1012 ; Menam, *Hosseus*, 716a.
Distr. Tropics.

Sida mysorensis, *W. & A.*—F.B.I., i. p. 322 ; Fl. Indo-Chine, i. p. 403.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 959.
Distr. India, Java, throughout Indo-China.

Abutilon indicum, *G. Don*—F.B.I., i. p. 326 ; Fl. Indo-Chine, i. p. 409.
Bangkok, *Schomburgk*, 208, *Zimmermann*, 165.
Distr. Tropics.

Malachra capitata, *Linn.*—F.B.I., i. p. 329 ; Fl. Indo-Chine, i. p. 411.
Bangkok, *Zimmermann*, 32.
Distr. Tropics.

Urena lobata, *Linn.*, var. **sinuata** (*Linn.*)—Fl. Indo-Chine, i. p. 414. *U. sinuata*, Linn.—F.B.I., i. p. 329.
Bangkok, *Zimmermann*, 22.
Distr. Tropics.

Urena repanda, *Roxb.*—F.B.I., i. p. 330 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 26 ; Fl. Indo-Chine, i. p. 416.
Chiengmai, Doi Sootep, 500 m., *Hosseus*, 278 ; Raheng, *Lindhard*, 64 ; Siam (?), *Candler*.
Distr. India, Burma, China.

Urena rigida, *Wall.*—F.B.I., i. p. 330 ; Fl. Indo-Chine, i. p. 414.
Siam (?), *Candler*.
Distr. India, Malacca, Borneo.

Malvaviscus arboreus, *Cavan.*—Fl. Indo-Chine, i. p. 412.
Bangkok, *Zimmermann*, 51.
Distr. Native of Trop. America and W. Indies, often cultivated in Tropics.

Decaschistia parviflora, *Kurz*, Journ. As. Soc. Beng., xxxix. p. 66. *D. Thorelii*, Pierre—Fl. Indo-Chine, i. p. 420.
Kanburi, *Teysmann*, in herb. Kurz ; Petchabouri, *Pierre*, 3922.
Distr. Cambodia.

Hibiscus Abelmoschus, *Linn.*—F.B.I., i. p. 342 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 26 ; Fl. Indo-Chine, i. p. 434. *H. cancellatus*, Williams, Bull. Herb. Boiss., v. (1905) p. 28, *non* Roxb.
Bangkok, *Schomburgk*, 310, *Zimmermann*, 148.
Distr. India ; generally cultivated in the Tropics.

Hibiscus cancellatus, *Roxb.*—F.B.I., i. p. 342, p.p. ; Fl. Indo-Chine, i. p. 435 ; *non* Williams, Bull. Herb. Boiss., v. (1905) p. 28.
Chiengmai, mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 764.
Distr. India, Yunnan.

***Hibiscus glanduliferus**, *Craib*, Kew Bull. 1910 p. 275.
Chiengmai, *Kerr*, 778.

Hibiscus Rosa-sinensis, *Linn.*—F.B.I., i. p. 344 ; For. Fl. Burma, i. p. 125 ; Fl. Indo-Chine, i. p. 429.
Bangkok, *Zimmermann*, 43, 79.
Distr. Tropics—often cultivated.

Hibiscus sagittifolius, *Kurz*—? Fl. Indo-Chine, i. p. 434.
Chiengmai, in open grassy spots on Doi Sootep, 450 m., *Kerr*, 638.
Distr. Burma, Cambodia, Cochinchina.
There is in Herb. Kew no authentically named material of *H. sagittifolius* but specimens sent to Kew lately from Maymyo which seem to fit Kurz's original description do not agree with specimens received from Paris under that name. Kerr's plant quoted above approaches var. *septentrionale*, Gagnep., Fl. Indo-Chine, l.c.

Hibiscus schizopetalus, *Hook. f.*—Fl. Indo-Chine, i. p. 432.
Bangkok, *Zimmermann*, 33.
Distr. Mozambique.

Hibiscus Solandra, *L'Herit.*—F.B.I., i. p. 336.
Ban Toong Cha, foot of Meh Ping Rapids, 120 m., *Kerr*, 906.
Distr. Trop. Africa, Afghanistan, India, Burma.

Hibiscus subnudus, *Craib*, sp. n., radice floribusque *H. sagittifolio*, Kurz, similis sed caulibus sub anthesin fere nudis, indumento diverso, involucri bracteis brevioribus differt.

Herba 15–31 cm. alta ; radix perennis, crassa, fusiformis vel napiformis ad 10 cm. longa, 6 cm. diametro ; caules annui, 2·5–4·5 mm. diametro, juventute erecti, anni praeteriti prostrati, primo pilis brevibus rigidiusculis reflexis dense obtecti et praeterea pilis longiusculis deciduis parce instructi. *Folia* cordato-reniformia vel sagittata, apice obtusa, 1·5–2 cm. longa, 1·2–1·7 cm. lata, rigide chartacea, crenata, utrinque pilis albis nitidis longiusculis rigidiusculis deciduis instructa, nervis e basi 5 utrinque conspicuis ; petioli 8–13 mm. longi, indumento ut in foliis ; stipulae parvae deciduae. *Pedunculi* axillares, uniflori raro furcati, 6·5–10 cm longi, indumento

ırt in caulibus. *Involucri* bracteae 7, e basi liberae, lineari-lanceolatae, obtusae, 1 cm. longae, 1·5 mm. latae, indumento brevi ut in caulibus et praeterea pilis longis sparse ciliatae. *Calyx* spathaceus vel in segmenta dua irregulariter fissus, involucrum paulo superans, puberulus. *Corolla* longe exserta, 5–6 cm. longa, 6–6·5 cm. diametro, sulphurea nisi oculo coccineo ; petala late obovata vel subrhomboidea, 4·7 cm. lata, glabra, ungui brevi. *Filamenta* in columnam 1·5 cm. altam connata. *Styli* rami 5, subconnati, stigmatibus spathulatis breviter pilosi. *Fructus* vix maturus, late ellipsoideus, 1·6 cm. altus, 1 cm. diametro, parce albo-hirsutus.

Near Meh Mău, 300 m., in deciduous jungle, *Kerr*, 1004.
Lao name, Chi Chau.

Hibiscus surattensis, *Linn.*—F.B.I., i. p. 334.
Doi Chieng Dao, 400 m., *Hosseus*, 468 ; Raheng, *Lindhard*, 65.
Distr. Trop. Asia, Australia, Africa.

Hibiscus vitifolius, *Linn.*—F.B.I., i. p. 338.
Chiengmai, 300 m., *Kerr*, 800.
Distr. Tropics—often cultivated.

Thespesia Lampas, *Dalz. et Gibs.*—F.B.I., i. p. 345 ; For. Fl. Burma, i. p. 128 ; Fl. Indo-Chine, i. p. 437.

Chiengmai, Doi Sootep, 300–720 m., *Kerr*, 795 ; Wang Djao, *Hosseus*, 54.

Distr. India, Burma, China, Cochinchina, Malaya, Africa.

Gossypium arboreum, *Linn.*—F.B.I., i. p. 347 ; Fl. Indo-Chine, i. p. 441.

Bangkok, *Zimmermann*, 131.

Sir G. Watt remarks on this plant that it is a "form approaching *G. Nanking*, Meyen."

Sterculiaceae.

Sterculia campanulata, *Wall.?*
Hills between Muang Prow and Chieng Dao, 600 m., *Kerr*, 1043.
The identification is not quite certain as the collection consists of a few male flowers.

Sterculia ornata, *Wall.*—For. Fl. Burma, i. p. 136 ; Fl. Indo-Chine, i. p. 466. *S. armata*, Mast., F.B.I., i. p. 367, p.p.
Doi Chieng Dao, 1700 m., *Hosseus*, 411.
Distr. Burma.

Sterculia pexa, *Pierre*—Fl. Indo-Chine, i. p. 462.
Bangkok, *Zimmermann*, 48.
Distr. Cochinchina.

Sterculia lanceolata, *Cav.*
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1088.
Distr. China.

Helicteres angustifolia, *Linn.*—F.B.I., i. p. 365, p.p. ; Fl. Indo-Chine, i. p. 495.
Wang Djao, *Hosseus*, 70a.
Distr. India, China, Malaya.

Helicteres elongata, *Wall.*—F.B.I., i. p. 365 ; For. Fl. Burma, i. p. 144 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 27.

Raheng, 120 m., *Kerr*, 902 ; Wang Djao, *Hosseus*, 60.
Distr. E. India, Burma.

Helicteres glabriuscula, *Wall.*—F.B.I., i. p. 366 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 26.
Chiengmai, in scrub jungle at foot of Doi Sootep, 300 m., *Kerr*, 630.
Distr. Burma.

Helicteres lanceolata, *DC.*—For. Fl. Burma, i. p. 142 ; Williams, Bull. Herb. Boiss., v. (1905) p. 29 ; Fl. Indo-Chine, i. p. 493. *H. angustifolia*, F.B.I., i. p. 365, p.p.
Wang Djao, *Hosseus*, 70.
Distr. Burma, Cochinchina, Java.

Helicteres plebeja, *Kurz*—F.B.I., i. p. 366 ; For. Fl. Burma, i. p. 144 ; Fl. Indo-Chine, i. p. 491.
Chiengmai, deciduous jungle on Doi Sootep, 720 m., *Kerr*, 630a.
Distr. Burma, Tonkin.
Very closely allied to, if not identical with, *H. elongata*.

Pterospermum semisagittatum, *Ham.*—F.B.I., i. p. 368 ; For. Fl. Burma, i. p. 146 ; Fl. Indo-Chine, i. p. 502.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1186.
Distr. Burma, Chittagong, Cambodia, S. India (cultivated ?)—often cultivated in tropics.

Eriolaena Candollei, *Wall.*—F.B.I., i. p. 370 ; For. Fl. Burma, i. p. 148 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 27 ; Fl. Indo-Chine, i. p. 506.
Raheng, on banks of Meh Ping, 120 m., *Kerr*, 899.
Distr. Burma.

Melochia corchorifolia, *Linn.*—F.B.I., i. p. 374 ; Fl. Indo-Chine, i. p. 509.
Chiengmai, bank of Meh Ping, 300 m., *Kerr*, 852.
Distr. Cosmopolitan in Tropics.

Tiliaceae.

Grewia aspera, *Roxb.* vel species arcte affinis. *G. abutilifolia*, Masters, F.B.I., i. p. 390 ; Williams, Bull. Herb. Boiss., v. (1905) p. 29, an Juss. ?
Chiengmai, in deciduous jungle on Doi Sootep, 300–720 m., *Kerr*, 631.
Distr. India, Burma, Cambodia, Malaya.

Grewia humilis, *Wall.*—F.B.I., i. p. 390. *G. asiatica*, Linn., var. *vestita*, Gagnep., Fl. Indo-Chine, i. p. 537, non *G. vestita*, Wall.
Bangkok, *Zimmermann*, 122.
Distr. Burma.

Grewia Lacei, *Drummond et Craib*, sp. n., e grege *G. tomentosae*, Juss., a qua foliorum paginae superioris indumento et venatione necnon marginum denticulis multo obscurioribus nec duplo-serratis bene cognoscitur ; a *G. hirsuta*, Vahl, atque ejusdem affinioribus, indumento diverso, foliis multo longioribus, et pedunculis pedicellisque multo brevioribus facile distinguenda.
Arbuscula sarmentosa, circiter 1·5 m. alta (*ex Kerr*) ; rami virgati, ligno albo nitido, cortice fusco libero in fibras satis longas

tenaciores demum soluto obtecti, juventi indumento densius inter-texto primo argenteo mox ferruginescente vestiti. *Folia* anguste oblongo-lanceolata, basi leviter obliqua, ad apicem obtusum vel acutum nonnunquam vere cuspidatum, costa autem vix excurrente, sensim angustata, 18 cm. vel plus longitudinis, 4·2 cm. latitudinis attingentia, petiolo vix 5 mm. longo hirsutissimo rufescente suffulta, versus basin quasi tricostata, nervis lateralibus ad decem paria, angulo satis acuto a costa exorientibus, leniter arcuatis in pagina superiore leviter impressis laxe hirsutis, in inferiore densius pilosis, versus basin prominentibus at superne prope evanidis, nervis transversis e primariis squarrose exorientibus varie curvatis non-nunquam ramificatis 2–3 mm. inter se remotis in pagina superiore venis lepide reticulatis sub oculo armato evidentibus connexis in inferiore propter tomentum omnino occultis, margine plus minusve at semper minute saepius irregulariter aliquando obscurissime denticulata, denticulis haud rariter pilorum quasi crista ornatis, subtus tomento aequo mollissimo dense coacto primum argenteo demum rufescente munita, supra pilis rarioribus subpellucidis singulis rarius bifurcatis at nunquam stellatis conspersa. *Inflorescentia* axillaris, polygamo-monoecia, e fasciculis duobus vel pluribus prope sessilibus, bracteolis singulis hirsutis inconspicuis instructis, constituta ; bractea circiter 4–6 mm. longa, ad basin deltoideam 1·5 mm. lata, superne in meram setam abeuns, valde pilosa ; pedicelli 2–5 mm. longi. *Sepala* oblongo-linearia, circiter 6 mm. longa, versus basin circiter 1·5 mm. lata, marginibus alte involuta, superne usque ad apicem cucullatum et obscure mucro-natum pedetentim angustata, interne aurantiaco-brunnea, externe tomento robusto fulvo nitido hirsuta. *Petala* floris ♂ ♀ circiter 1·5 mm. longa, 1 mm. lata, parum incrassata, dorso pilis fulvis hirsuta, nectario mellis colore oculo pallidiore pilorum similium annulo circumdato infra unguem 0·5 mm. attingente, ungui flavescente vix 0·5 mm. longo 1 mm. lato apice praemorso. *Androgynophorii* columna circa 1 mm. longa, 0·5 mm. diametro, plus minusve compressa, subpurpurascens ; clavulus ovarium includens, iisdem pilis fulvis dense indutus ; stamina circa 20 vel pauciora, filamentis circiter 2 mm. longis. *Drupa* ex quattuor pyrenis plus minus per paria accretis, constans, depressa, subquadrata, pilis longiusculis albidis 2–5 in tuberculis badii coloris junctim insidenti-bus instructa, juventa fusca, maturior subflava, glabrescens.

Burma, Maymyo Plateau, 1050 m., *Lace*, 3223.

Chiengmai, in deciduous jungle on Doi Sootep, 720 m., *Kerr*, 677.

To this species probably belongs a plant collected in Laos by *Spire* (No. 547), but the material of the collection in Herb. Kew is too insufficient for a definite decision.

Grewia Microcos, *Linn.*—F.B.I., i. p. 392.

Chiengmai plain, on waste ground, 300 m., *Kerr*, 613.

Distr. India, Burma, Assam, China, Malaya.

Allied to *G. Microcos* is a specimen collected by the Siam Forest Officers (No. 170) which may probably be *G. ulmifolia*, Roxb.

Grewia tomentosa, *Juss.*

Banks of Meh Ping near Raheng, 120 m., *Kerr*, 903 ; Wang Djao, *Hosseus*, 69.

Grewia trichodes, *Voigt.* *G. pilosa*, Roxb., *non* Lamarck.
Chiengmai, 300 m., *Kerr*, 1249.

In identifying the plants belonging to this critical genus I have availed myself of the able assistance of Mr. J. R. Drummond who has spent much time in the study of this group. The present state of our knowledge of the Indo-Chinese species and the complicated synonymy of the Indian species have forbidden the giving as full references to published works as have been given throughout the rest of this paper.

Columbia floribunda, *Wall.*—F.B.I., i. p. 393 ; For. Fl. Burma, i. p. 156 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 28 ; Fl. Indo-Chine, i. p. 549.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1325.
Distr. Burma, Assam, Yunnan.

Columbia flagrocarpa, *C. B. Clarke ex Brandis*, var. **siamica,** *Craib*, var. nov., a typa ramulis paniculisque pilis longis haud vel parcissime instructis, petiolis tenuioribus paulo longioribus, foliis basi vix tam obliquis, fructusque umbonis pilis minus rigidis.
Chiengmai, mixed jungle on Doi Sootep, 450–540 m., *Kerr*, 895, 895a.
At first sight the variety is markedly different from the type in the total or almost total suppression of the rather long stiffish hairs on the branchlets and panicles. The type is represented by Clarke's fruiting Chittagong specimens only and the fruit except for the rather stiffer hairs on the umbo is very similar to that of the Siam plant.

Triumfetta procumbens, *Williams*, Bull. Herb. Boiss., v. (1905) p. 28, *non* Forst. f.
The sheet quoted by Williams l.c. contains specimens belonging to two distinct species and moreover both specimens were collected in the island of Phu Quoc in Cochinchina and not in Siam.

Triumfetta pseudocana, *Sprague et Craib*, nom. nov. *T. cana*, Lawson, F.B.I., i. p. 396, *non* Blume. *T. tomentosa*, Gagnep., Fl. Indo-Chine, i. p. 552, *vix* Bojer.
Chiengmai, Doi Sootep, 300–720 m., *Kerr*, 810.
Distr. India, China, Tonkin, Malaya, Philippines.

Corchorus acutangulus, *Lamk.*—F.B.I., i. p. 398 ; Fl. Indo-Chine, i. p. 558.
Chiengmai, among grass, 300m., *Kerr*, 855.
Distr. Tropics.

Muntingia Calabura, *Linn.*—Fl. Indo-Chine, i. p. 562.
Bangkok, *Zimmermann*, 6.
Introduced from Trop. America.

Elaeocarpus floribundus, *Blume*—F.B.I., i. p. 401 ; For Fl. Burma, i. p. 167.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 689a.
Distr. N. India, Burma, Cambodia, Malaya.

Elaeocarpus siamensis, *Craib*, sp. n., ex affinitate *E. Wallichii*, Kurz, a quo petiolis tomentellis, foliis minoribus basi plerumque cuneatis facile distinguenda.

Arbor circiter 9 m. alta (*ex Kerr*), ramulis teretibus juventute dense puberulis mox fere glabris cortice rubro vel cinereo-rubro parce lenticellato obtectis. *Folia* lanceolata vel ovato-lanceolata, apice acuminata basi interdum inaequalia, cuneata vel obtusa, 7–14 cm. longa, 2·6–6 cm. lata, chartacea, supra costa tantum pubescente mox fere glabra, subtus costa nervisque praecipue molliter puberula, margine glanduloso-serrulata, nervis lateralibus utrinque 11–14 intra marginem arcuatis supra leviter impressis subtus prominentibus nervis transversis supra plerumque conspicuis subtus prominulis; petioli 1·8–2·7 cm. longi, juventute tomentelli, mox puberuli, supra apicem versus glandulis 2–3 instructi. *Racemi* ex axillis veteribus breviter pedunculati, circiter 15 cm. longi, rachi angulato puberulo; bracteae ante anthesin deciduae; pedicelli 6 mm. longi, breviter pubescentes. *Sepala* 5, lanceolata, obtusa, 4 mm. longa, 1·5 mm. lata, utrinque, intus parcius, imperfecte sericeo-pubescentia. *Petala* 5, alba, cuneata, fere 5 mm. longa, 4 mm. lata, fere ad medium fimbriata, parte integra ciliata intusque basem versus parce pubescentia. *Stamina* inclusa, filamentis brevibus; antherae breviter puberulae, apice pilis longiusculis parce instructae. *Disci* glandulae 5, pubescentes. *Ovarium* 3-loculare, pubescens; stylus deciduus, staminibus paulo brevior, apice glaber, basi ut in ovario pubescens. *Fructus* ignotus.

Chiengmai, evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1200. Lao name, Mai Moon.

Linaceae.

Erythroxylon burmanicum, *Griff.*—F.B.I., i. p. 414; For. Fl. Burma, i. p. 171.

Chiengmai, Doi Sootep, 300–600 m., *Kerr*, 652.

Distr. Burma, Malaya.

Differs from typical *E. burmanicum*, in the leaves having generally fewer nerves and the reticulation being rather more prominent and open on the under surface.

Malpighiaceae.

Hiptage candicans, *Hook. f.*, F.B.I., i. p. 419; For. Fl. Burma, i. p. 174; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 29.

Meh Taang, 360 m., *Kerr*, 1064.

Distr. Burma, Manipur, Yunnan.

Hiptage Madablota, *Gaertn.*—F.B.I., i. p. 418; For. Fl. Burma, i. p. 173.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 563.

Distr. India, Burma, China, Malay Archipelago, Philippines.

Zygophyllaceae.

Tribulus terrestris, *Linn.*—F.B.I., i. p. 423; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 29.

Raheng, 120 m., *Kerr*, 904.

Distr. Tropics.

Geraniaceae.

Impatiens Mengtszeana, *Hook. f.*, Nuov. Arch. Mus. Hist. Nat. Par., Ser. iv. x. p. 256.

Chiengmai, Doi Sootep, 600–900 m., *Kerr*, 590.—det. Hook. f.

Distr. Yunnan (ex Hook. f., l.c.).

Biophytum sensitivum, *DC.*—F.B.I., i. p. 436; Williams, Bull. Herb. Boiss., v. (1905) p. 217.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 805.

Distr. Tropics.

Rutaceae.

Evodia triphylla, *DC.*—F.B.I., i. p. 487; For. Fl. Burma, i. p. 180.

Chiengmai, in evergreen jungle on Doi Sootep, 1050–1350 m., *Kerr* 1109, 1286.

Distr. Burma, China.

Zanthoxylum acanthopodium, *DC.*—F.B.I., i. p. 493; For. Fl. Burma, i. p. 181.

Chiengmai, Doi Sootep, 1500–1650 m., *Kerr*, 1103.

Distr. Himalaya and Khasia Hills, Burma, China.

Glycosmis pentaphylla, *Correa*, var. a, *Oliver*, Journ. Linn. Soc., v. suppl. 2 p. 37; F.B.I., i. p. 500. *G. pentaphylla*, Correa—For. Fl. Burma, i. p. 186?; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 30.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1265.

Distr. Throughout India, Indo-China, Malaya, Australia.

Micromelum hirsutum, *Oliver*—F.B.I., i. p. 502; For. Fl. Burma, i. p. 187; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 30.

Siam Forest Service, 141.

Distr. Burma, Malaya.

Micromelum pubescens, *Blume*—F.B.I., i. p. 501; For. Fl. Burma, i. p. 186.

Lakon, Hooey Meh Tan, 450 m., *Kerr*, 1017; Kow Sabap, 690 m., *Murton*, 108; Kow Hoo Wen, *Murton*, 107.

Distr. Himalaya, Burma, China, Malaya.

Triphasia trifoliata, *DC.*—F.B.I., i. p. 507; For. Fl. Burma, i. p. 192.

Bangkok, *Zimmermann*, 138.

Distr. Tropics.

Clausena excavata, *Burm.*—F.B.I., i. p. 504; For. Fl. Burma, i. p. 188.

Near Meh Maŭ, 300 m., *Kerr*, 1007; *Siam Forest Service*, 162.

Distr. E. Himalaya, Yunnan, Malaya, Philippines.

Clausena Wallichii, *Oliver?*

Doi Saket, near Ban Sun Pak Suk, 600 m., *Kerr*, 1027.

I have been unable to confirm this identification by reference to any authentic material of the species.

Luvunga scandens, *Ham.*—F.B.I., i. p. 509; For. Fl. Burma, i. p. 191.

Chiengmai, Doi Sootep, 800 m., *Hosseus*, 430.

Distr. India, Burma, Cochinchina, Sumatra.

Simarubaceae.

Quassia amara, *Linn.*
Bangkok, *Zimmermann*, 67, 169.
Distr. Native of Trop. America, often cultivated in Tropics.

Picrasma javanica, *Blume*—F.B.I., i. p. 520; For. Fl. Burma, i. p. 201.
Meh Ping, Doi Chieng Dao, 420 m., *Kerr*, 1057.
Distr. Burma, Malacca, Java.

Brucea mollis, *Wall.*—F.B.I., i. p. 521; For. Fl. Burma, i. p. 202.
Chiengmai, Doi Sootep, 1000 m., *Hosseus*, 432.
Distr. E. Himalaya, Burma.

Brucea sumatrana, *Roxb.*—F.B.I., i. p. 521; For. Fl. Burma, i. p. 202.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 589.
Distr. India, Burma, China, Malaya.

Eurycoma longifolia, *Jack*—F.B.I., i. p. 521; For. Fl. Burma, i. p. 202; Williams, Bull. Herb. Boiss., v. (1905) p. 218.
Chiengmai, Doi Sootep, 450–750 m., *Kerr*, 633, *Hosseus*, 479a.
Distr. Burma, Malaya, Philippines.

Irvingia malayana, *Oliver*—F.B.I., i. p. 522.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 1141, 1141a.
Distr. Malacca.

Harrisonia Bennetii, *Planch.*—F.B.I., i. p. 519; For. Fl. Burma, i. p. 203; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 31.
Doi Chieng Dao, 450 m., *Kerr*, 1048, 1048a.
Distr. Burma, China, Malaya.
Lao name, Mai Chi.

Ochnaceae.

Ochna Wallichii, *Planch.*—F.B.I., i. p. 524; For. Fl. Burma, i. p. 205.
Chiengmai, Doi Sootep, 300–600 m., *Kerr*, 544, *Hosseus*, 445; *Siam Forest Service*, 176.
Distr. Burma.

Burseraceae.

Garuga pinnata, *Roxb.*—F.B.I., i. p. 528; For. Fl. Burma, i. p. 207; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 31.
Near Pang Pooey, 420 m., *Kerr*, 1002.
Distr. India, Malaya.

Protium serratum, *Engler. Bursera serrata*, Colebr.—F.B.I., i. p. 530; For. Fl. Burma, i. p. 208.
Chiengmai, in eng jungle, 300m., *Kerr*, 581.
Distr. Bengal, Burma, Assam.

Canarium Kerrii, *Craib*, sp. n., facie *C. resinifero*, Brace ex King, similis sed foliolis fere glabris, inflorescentiae rachi breviter parce puberulo, drupa paulo breviore basi rotundata distincta.

Arbor parva vel mediocris (*ex Kerr*); ramuli teretes, jnventute fulvo-tomentelli vel villosi, demum puberuli vel fere glabri, cortice

rubro-brunneo lenticellato striato obtecti. *Folia* 7–9 foliolata, 22–29 cm. longa ; petiolus communis 11·5–14 cm. longus, cum rachi sulcatus minuteque puberulus ; stipulae deciduae, lineari-lanceolatae, ad 9 mm. longae, fulvo-villosae ; foliola opposita, variabilia, plerumque oblonga vel ovato-lanceolata, apice breviter acuminata, obtusa, basi interdum inaequalia, cuneata, truncata vel cordata, 8–15·5 cm. longa, 4·3–8·5 cm. lata, rigide chartacea, margine subintegra, glabra nisi costa supra, costa nervisque primariis subtus puberulis, nervis lateralibus utrinque 10–13 intra marginem arcuatis supra prominulis subtus prominentibus, nervulis utrinque prominulis; petioluli puberuli, 5–13 mm. longi, foliolo terminali a lateralibus 2–2·8 cm. distante. *Inflorescentia* ♂ e cymis racemose dispositis 6·5–9·5 cm. longa, pedunculo communi 6–9 cm. longo, pedunculis partialibus ad 1·5 cm. longis ; bracteae lineari-lanceolatae, 5 mm. longae, utrinque pubescentes. *Calyx* 4 mm. longus, 2·5 mm. diametro, lobis 3 brevibus, extus breviter appresse pilulosus. *Corolla* longe exserta, vix 1 cm. longa, petalis 3 lineari-oblanceolatis indumento extus ut in calyce. *Stamina* 6, filamentis 6 mm. longis ad medium in tubum connatis. *Ovarii* rudimentum parvum, breviter hirsutum. *Inflorescentia* ♀ ignota. *Infructescentia* quam inflorescentia ♂ dimidio brevior. *Drupa* ovoidea, 3 cm. alta, 2 cm. diametro, glabra, sicco nigra, endocarpio ligneo 2–2·5 mm. lato.

Chiengmai, mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 605.

Meliaceae.

Melia Azadirachta, *Linn.*—F.B.I., i. p. 544 ; For. Fl. Burma, i. p. 212.

Chiengmai, 300 m., *Kerr*, 542.

In a note Kerr says this tree may be merely cultivated as it occurs always near houses. The flowers and young leaves, which are bitter, are boiled and eaten with rice.

Lao name, Saliem.

Melia Toosendan, *Sieb. et Zucc.*—King, Journ. As. Soc. Beng., lxiv. p. 20.

Muang Prow, Meh Kaut, 450 m., *Kerr*, 1034.

Distr. Japan, Khasia, Manipur, Sumatra.

Lao name, Mai Krien.

Amoora Rohituka, *W. et. A.*—F.B.I., i. p. 559 ; For. Fl. Burma, i. p. 220 ; Williams, Bull. Herb. Boiss., v. (1905) p. 218.

Chiengmai, Doi Sootep, 900 m., *Kerr*, 713.

Distr. India, China, Malay Peninsula, Sumatra.

Walsura villosa, *Wall.*—F.B.I., i. p. 564 ; For. Fl. Burma, i. p. 223 ; Williams, Bull. Herb. Boiss., v. (1905) p. 219.

Meh Kung, 450 m., *Kerr*, 1023.

Distr. Burma, Cochinchina.

Lao name, Mai Ki Qau.

Heynea trijuga, *Roxb.*—F.B.I., i. p. 564. *Walsura trijuga*, Kurz, For. Fl. Burma, i. p. 225.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 591.

Distr. India, Burma, Yunnan, Malay Peninsula.

Olacaceae.

Olax scandens, *Roxb.*—F.B.I., i. p. 575; For. Fl. Burma, i. p. 233; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 31. *Loranthus securidacoides*, Warb. apud De Willd., Pl. Nov. Herb. Hort. Then., Tab. lxxxi.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 1222; Bangkok, *Zimmermann*, 119; Lem Tong Lan, *Murton*, 127.

Distr. India, Burma, China, Java.

Anacalosa ilicoides, *Mast.*, F.B.I., i. p. 580.

Chiengmai, Doi Sootep, 600–750 m., *Kerr*, 1192.

Distr. Khasia.

Icacinaceae.

Pittosporopsis, *Craib*, gen. nov., *Apodyti*, E. Mey., affine, inflorescentia axillari tantum, calyce majore 5-partito, petalis apice induplicato-valvatis inferne apertis, antherarum connectivo producto, stylo haud excentrico distinctum.

Flores hermaphroditi. *Calyx* 5-partitus, diu persistens. *Petala* 5, spathulata, apice induplicato-valvata, basi aperta. *Stamina* 5, petalis alterna iisque basi brevissime adnata; filamenta complanata, superne subito contracta; antherae oblongae, basi bilobae, dorso affixae, connectivo apice producto. *Discus* ovario adnatus. *Ovarium* ellipsoideum, uniloculare, ovulis 2 pendulis; stylus sub anthesin rectus, mox basin versus geniculatus, diu persistens. *Fructus* immaturus tantum visus; pedicelli nodus supremus articulatus, incrassatus, cum fructu deciduus.—*Frutex* inermis. *Folia* simplicia, alterna, chartacea, margine cartilagineo undulato. *Inflorescentia* axillaris, cymosa, floribus majusculis.

Species unica.

Pittosporopsis Kerrii, *Craib*, sp. n.

Frutex ad 4·5 m. altus (*ex Kerr*); ramuli subteretes, glabri, cortice fusco-brunneo obtecti. *Folia* oblongo-oblanceolata vel oblonga, apice acuminata vel fere caudato-acuminata, apice subobtusa, basi cuneata, 14–21 cm. longa, 4–6·5 cm. lata, chartacea, utrinque glabra nisi costa subtus minute parceque pilulosa, margine cartilagineo undulato, nervis lateralibus utrinque 5–7 intra marginem arcuatis supra leviter impressis subtus cum nervis transversis prominentibus; petioli 2 cm. longi, supra canaliculati, fere glabri. *Inflorescentia* axillaris, pedunculo communi 1·5–2·5 cm. longo; cymulae 3-florae, pedunculo circiter 4 mm. longo suffultae; pedicelli breves, nodis supremis articulatis, bracteolis 3–4 parvis infra articulationem instructi. *Calycis* lobi late deltoidei, acuti, 1 mm. longi, 1 mm. lati, extus pilulosi, sub anthesin reflexi, infructescentes fructui appressi. *Petala* elongato-spathulata, circiter 7 mm. longa 2 mm. lata, extus medio parcissime pilulosa. *Filamenta* complanata, superne subito contracta, 5 mm. longa, basi 0·75 mm. lata; antherae versatiles, oblongae, basi bilobae, fere 2 mm. longae, connectivo apice producto. *Discus* cupularis, ovario adnatus, circiter 0·75 mm. altus. *Ovarium* glabrum, circiter 1·75 mm. altum, ovulis 2 pendulis; stylus crassiusculus, apice brevissime bifidus, 3 mm. longus, glaber. *Fructus* immaturus, cum pedicelli nodo supremo leviter incrassato deciduus.

Chiengmai, in evergreen jungle on Doi Sootep, 750 m., *Kerr*, 558.

Distr. Burma, S. Shan States, *Macgregor*, (Herb. Kew et Calcutta).

Aquifoliaceae.

Ilex sulcata, *Wall.*—F.B.I., i. p. 604.

Chiengmai, in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 1120.

Distr. Bengal, Assam, Burma.

Probably identical with *I. Godayam*, Kurz, For. Fl. Burma, i. p. 245 (ex Brandis).

Celastraceae.

Euonymus sp. n.? near *E. glaber*, Roxb. and *E. timoriensis*, Zipp.

Chiengmai, Doi Sootep, 720–1200 m., *Kerr*, 649, 736.

In the absence of fruit I hesitate to describe this as new.

Celastrus paniculata, *Willd.*—F.B.I., i. p. 617; For. Fl. Burma, i. p. 252; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 32: Williams, Bull. Herb. Boiss., v. (1905) p. 224.

Chiengmai, Doi Sootep, 320 m., *Kerr*, 586.

Distr. India, Malaya.

Salacia prinoides, *DC.*—F.B.I., i. p. 626; For. Fl. Burma, i. p. 260.

Palat, 300 m., *Kerr*, 1008.

Distr. India, Burma, Malaya.

Rhamnaceae.

Ventilago calyculata, *Tul.*—F.B.I., i. p. 631; For. Fl. Burma, i. p. 262; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 33.

Hooey Meh Tan, 420 m., *Kerr*, 1015.

Distr. India, Malaya.

Zizyphus Jujuba, *Lamk.*—F.B.I., i. p. 632; For. Fl. Burma, i. p. 266.

Chiengmai, 300 m., *Kerr*, 1229.

Distr. Afghanistan eastwards to China, Malaya, Australia, Africa.

Lao name, Mă Tan.

Zizyphus Oenophila, *Mill.*—F.B.I., i. p. 634; For. Fl. Burma, i. p. 266; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 33.

Chiengmai, Doi Sootep, 300–900 m., *Kerr*, 696.

Distr. Tropical Asia, Australia.

Zizyphus rugosa, *Lamk.*—F.B.I., i. p. 636; For. Fl. Burma, i. p. 265; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 33.

Chiengmai, in deciduous jungle on Doi Sootep, 300–720 m., *Kerr*, 564, 1077, 1077a.

Distr. India, Burma.

Colubrina asiatica, *Brongn.*—F.B.I., i. p. 642; For. Fl. Burma, i. p. 268.

Paknampo, *Hosseus*, 20.

Distr. India, Burma, China, Malaya, Australia.

Colubrina pubescens, *Kurz*—F.B.I., i. p. 642; For. Fl. Burma, i. p. 269.
Siam Forest Service, 165.
Distr. Burma.

Ampelidaceae.

Tetrastigma cruciatum, *Craib et Gagnep.*, sp. n., a *T. tuberculato*, Blume (sub *Cisso*), stigmate grandi sessili cruciato valde distinctum.
Ramuli scandentes, glabri, primo fere teretes, graciles, mox compressi, dense tuberculati. *Folia* trifoliolata, petiolis 2·7–4·5 cm. longis suffulta; foliola oblanceolata vel anguste obovata, apice acuminata, mucronata, basi terminalia in petiolulum attenuata, lateralia obtusa parum obliqua, 8–11·5 cm. longa, 3·5–5·5 cm. lata, subcoriacea, utrinque glabra, juventa distanter crasse serrata, mox subintegra subsinuata, nervis lateralibus utrinque 4–6 intra marginem arcuatis pagina neutra valde conspicuis; petioluli semicentimetrales, inter se aequales. *Inflorescentia* axillaris, globosa, congesta, 1 cm. diametro; pedicelli compressi, 1–2 mm. longi, dense pilosi; alabastra cylindracea apice dilatato-truncata, papillata. *Calyx* brevis, cupuliformis, pilulosus, dentibus triangularibus acutis. *Petala* alba, deltoidea, fere 2 mm. longa, 1·25 mm. lata, ad marginem apicemque papillata, corniculata, corniculis brevibus, divaricatis papillatis 0·5 mm. longis. *Discus* brevis, annularis, ad basin ovarii adnatus, ovarium strangulans. *Stamina* fertilia non visa. *Ovarium* glabrum, vix 1 mm. altum, loculis 2 biovulatis; stigma sessile, cruciatum, circiter 1 cm. diametro, ramis 4 divaricatis apice sensim dilatatis truncato-emarginatis.
Chiengmai, in thick evergreen jungle on Doi Sootep, 900 m., *Kerr*, 599.
Mons. Gagnepain, who is at present engaged in a study of the species of *Vitis* and allied genera and who has kindly collaborated with me in the description of this species, has supplied very copious notes on two allies of this plant.
T. cruciatum differs from *T. rupestre*, Planch., in (1) its petiolules being equal and its leaflets more symmetric at the base; (2) its sessile inflorescence; (3) its corolla not all papillose; (4) its large Maltese cross-shaped stigma; and (5) its small acute calyx teeth.
From *T. glabratum*, Planch., it is distinguished by (1) its larger leaflets with equal petiolules; (2) its more condensed and much narrower inflorescence; (3) its shorter flower buds; (4) its corniculate petals; (5) its large sessile stigma; and (6) its short acute (not truncate) calyx teeth.
Mons. Gagnepain further remarks that *T. cruciatum* possesses the largest stigma of the species examined by him.

Tetrastigma lanceolarium, *Planch*, p.p. *Vitis lanceolaria*, Roxb.—F.B.I., i. p. 660; For. Fl. Burma, i. p. 272.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 919.
Distr. India, Burma, Assam, China, Malay Peninsula.

Parthenocissus semicordata, *Planch.* *Vitis semicordata*, Wall.—King, Journ. As. Soc. Beng., lxv. p. 113. *V. himalayana*, Brandis, var. *semicordata*, Lawson, F.B.I., i. p. 656; For. Fl. Burma, i. p. 273.

Chiengmai, in evergreen jungle on Doi Sootep, 1590 m., *Kerr*, 1296.

Distr. Sikkim, Khasia.

Cissus adnata, *Roxb.* *Vitis adnata*, Wall.—F.B.I., i. p. 649; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 33.

Chiengmai, in scrub jungle at foot of Doi Sootep, 330 m., *Kerr*, 1233.

Distr. India, throughout Indo-China, Malaya.

Cissus assamica, *Craib*, comb. nov. *Vitis assamica*, Lawson, F.B.I., i. p. 648.

Chiengmai, in scrub jungle at foot of Doi Sootep, 330 m., *Kerr*, 1232.

Distr. Assam, Bengal, (Burma ?).

Planchon in his monograph includes this plant under *C. adnata* as a "forma glabrior."

Cissus carnosa, *Lamk.* *Vitis carnosa*, Wall.—F.B.I., i. p. 654.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1228.

Distr. India, Burma, Assam, China, Malaya.

Cissus discolor, *Blume.* *Vitis discolor*, Dalz.—F.B.I., i. p. 647; For. Fl. Burma, i. p. 271; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 33.

Chiengmai, in evergreen jungle on Doi Sootep, 720–1350 m., *Kerr*, 726.

Distr. India, Burma, Assam, Malaya.

Cissus Kerrii, *Craib*, sp. n., ab affini *C. repente*, Lamk., foliis lobatis valde distincta.

Planta disco excepto glaberrima; ramuli teretes, sulcati, 3 mm. diametro, juventute lepidoti, mox ut in *V. repente* albi. *Folia* ambitu interdum reniformia plerumque late ovata vel rotundata, basi cordata, 3-lobata lobis deltoideis apice acutis mucronatis, 6–11 cm. longa, 5–10·5 cm. lata, chartacea, margine remote denticulato-serrata, trinervata, nervis secondariis (e costa ortis) utrinque 4–5 omnibus utrinque prominulis nervis transversis subtus conspicuis; petioli 2–6·5 cm. longi; stipulae deciduae, oblongae, basi truncatae, apice rotundatae, 5 mm. longae, 2·5 mm. latae; cirrhi oppositifolii, simplices. *Cymae* oppositifoliae, umbellatim dispositae, pedunculo communi ad 4 cm. longo, pedunculis partialibus 1–1·5 cm. longis; bracteae parvae. *Calyx* cupuliformis, 1 mm. diametro. *Petala* 4, oblonga, cucullata, 2·5 mm. longa, 1·75 mm. lata. *Stamina* 4, filamentis 1·25 mm. longis. *Discus* ovario aequialtus, margine crenulato interdum parcissime puberulo. *Stylus* brevis, obtusus. *Fructus* ignotus.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1238.

Cissus pedata, *Lamk.* *Vitis pedata*, Vahl—F.B.I., i. p. 661; For. Fl. Burma, i. p. 273.

Chiengmai, Doi Sootep, 330 m., *Kerr*, 1210.

Distr. India, Burma, Assam, Java.

Ampelocissus Martini, *Planch.*, DC. Monogr., v. 2, p. 373. *Vitis barbata*, Wall., var. *trilobata*, King—Williams, Bull. Herb. Boiss., v. (1905) p. 216.

Chiengmai, in mixed jungle at foot of Doi Sootep, 330 m., *Kerr*, 1206.

Distr. Cambodia, Cochinchina, Malay Peninsula (Hong Kong, cult.).

Sapindaceae.

Cardiospermum Halicacabum, *Linn.*—F.B.I., i. p. 670.

Chiengmai, in scrub jungle on banks of Meh Ping, 300 m., *Kerr*, 757.

Distr. Tropics.

Allophylus varians, *Craib*, sp .n., habitu *A. longipidi*, Radlkofer, similis sed racemis saepissime haud furcatis differt.

Fruticulus 1·2 m. altus (*fide Kerr*); ramuli teretes, 3 mm. diametro, fere glabri, cortice rubro-brunneo obtecti. *Folia* trifoliolata; foliola breviter petiolulata, oblanceolata vel oblongo-lanceolata, apice acuminata obtusa, basi terminalia cuneata lateralia inaequalia obtusa, foliorum ramulorum apices versus maxima ad 19 cm. longa 5·5 cm. lata, foliorum paulo inferius 4·5–12·5 cm. longa, 1·8–4 cm. lata, membranacea, juventute utrinque pilulosa mox fere glabra, margine praecipue a medio apices versus distanter serrata, nervis lateralibus utrinque 10–11 ad marginem excurrentibus cum costa supra conspicuis subtus prominulis nervis transversis utrinque, subtus magis, conspicuis; petioli foliorum majorum 10·5–13·5 cm. longi, minorum 3–6 cm. longi, supra canaliculati, puberuli vel fere glabri. *Thyrsi* axillares, solitarii, saepissime simplices, 7–15 cm. longi, pedunculo communi 1·5–2·5 cm. longo, fere glabri. *Pedicelli* graciles, 2 mm. longi, glabri. *Flores* albi, mediocres, glabri. *Fructus* ignotus.

Chiengmai, thin bush about 1·2 m. high in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 685.

Schleichera trijuga, *Willd.*—F.B.I., i. p. 681; For.-Fl. Burma, i. p. 289; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 36.

Chiengmai, Doi Sootep, 300–330 m., *Kerr*, 571, 1184; Ban Pou, Meh Saang, 390 m., *Kerr*, 1062.

Distr. India, Burma, Malaya.

Lao name, Ma Chohk.

Otophora cambodiana, *Pierre*

Bangkok, *Zimmermann*, 112.

Distr. Cambodia.

Staphyleaceae.

Turpinia nepalensis, *Wall.*—For. Fl. Burma, i. p. 292. *T. pomifera*, Wall.—F.B.I., i. p. 698 p. p.

Chiengmai, Doi Sootep, 1600 m., *Hosseus*, 504.

Distr. India, Burma, China.

Turpinia pomifera, *Wall.*—F.B.I., i. p. 698 p. p.; For. Fl. Burma, i. p. 292; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 36.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 536; between Muang Prow and Chieng Dao, 600 m., *Kerr*, 1047.

Distr. India, throughout Indo-China, Malaya.

Sabiaceae.

Meliosma simplicifolia, *Roxb.*—F.B.I., ii. p. 5 ; For. Fl. Burma, i. p. 301.

Muang Prow, Hooey Meh Wah, 540 m., *Kerr*, 1041.

Distr. India, Burma, Assam, Yunnan.

Meliosma simplicifolia, *Roxb.*, var. **sootepensis**, *Craib*, var. nov., a typo ramulorum indumento parciore, cortice rubro-brunneo haud nigro, foliis oblongo-oblanceolatis apice obtusis vix acuminatis integris, foliorum maturorum nervis supra leviter impressis subtus valde prominentibus differt.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 535.

According to Dr. Kerr this tree, which is about 12 m. high has the young branches mostly hollow and inhabited by a small black ant.

Anacardiaceae.

Buchanania latifolia, *Roxb.*—F.B.I., ii. p. 23 ; For. Fl. Burma, i. p. 307 ; Fl. Indo-Chine, ii. p. 10.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 946.

Distr. India, Burma, Yunnan, Cambodia.

Buchanania sp. aff. *B. glabrae*, Wall.

Wang Djao, *Hosseus*, 144 ; Chiengmai, Doi Sootep, *Hosseus*, 283.

Probably represents a new species but the material in Herb. Kew is too incomplete to admit of certainty.

Melanorrhoea usitata, *Wall.*—F.B.I., ii. p. 25 ; For. Fl. Burma, i. p. 318 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 36 ; Fl. Indo-Chine, ii. p. 25.

Chiengmai, Doi Sootep, 300–900 m., *Kerr*, 933.

Distr. Throughout Indo-China, Malay Peninsula.

Lao name, Mai Hak.

Odina Wodier, *Roxb.*—F.B.I., ii. p. 29 ; For. Fl. Burma, i. p. 321 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 36 ; Fl. Indo-Chine, ii. p. 34.

Between Lakon and Phre, 300 m., *Kerr*, 978 ; Pang Pooey, 420 m., *Kerr*, 1003.

Distr. India, Burma, Malaya.

Spondias mangifera, *Willd.*—F.B.I., ii. p. 42 ; For. Fl. Burma, i. p. 322 ; Fl. Indo-Chine, ii. p. 28.

Hills between Muang Prow and Chieng Dao, 600 m., *Kerr*, 1045.

Distr. India, Burma, China, Cochinchina, Malaya.

Lao name, Mă Kauk.

Connaraceae.

Connarus gibbosus, *Wall.*—F.B.I., ii. p. 52 ; For. Fl. Burma, i. p. 327 ; Williams, Bull. Herb. Boiss., iv. (1904) p. 1034.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 1071.

Distr. Burma, Malay Peninsula.

Ellipanthus tomentosus, *Kurz*—F.B.I., ii. p. 56 ; For. Fl. Burma, i. p. 330 ; Prain, Journ. As. Soc. Beng., lix. p. 209.
Lakon plain, 300 m., *Kerr*, 972.
Distr. Burma.

Leguminosae.

Crotalaria acicularis, *Ham.*—F.B.I., ii. p. 68 ; Prain, Journ. As. Soc. Beng., lxvi. p. 349. *C. humifusa*, Drake, Journ. de Bot., v. p. 186 ; C. B. Clarke apud Ostenfeld, Bull. Herb. Boiss., v. (1905) p. 713 ; *non* Grah.
Raheng, *Lindhard*, 27.
Distr. Madras, Bengal to Tenasserim, China, Tonkin, Java.

Crotalaria alata, *Ham.*—F.B.I., ii. p. 69 ; *non* Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 37.
Chiengmai, Doi Sootep, 450–600 m., *Kerr*, 776 ; Wang Djao, *Hosseus*, 59a ; Petchabouri, *Hosseus*, 714a.
Distr. Kumaon to Khasia, Burma, China, Java.

Crotalaria albida, *Heyne*—F.B.I., ii. p. 71 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 38.
Chiengmai, evergreen jungle on Doi Sootep, 1050 m., *Kerr*, 876.
Distr. India, Burma, China, Malaya.

Crotalaria assamica, *Benth.*—F.B.I., ii. p. 75 ; Prain, Journ. As. Soc. Beng., lxvi. p. 352.
Chiengmai, Doi Sootep, 700–720 m., *Kerr*, 830, *Hosseus*, 302.
Distr. Assam, Upper Burma, China, Philippines.

Crotalaria bracteata, *Roxb.*—F.B.I., ii. p. 83.
Meh Ping Rapids, near Ban Kan, 180 m., *Kerr*, 909.
Distr. India, Burma, Yunnan, Philippines.

Crotalaria Hossei, *Craib*, sp. n., floribus leguminibusque *C. albidae*, Heyne, foliis *C. linifoliae*, Linn., similis, ab ambabus habitu distincta.

Rhizoma lignosum, ad 26 cm. longum. *Caules* solitarii, plerumque usque ad inflorescentiam simplices, 30–70 cm. alti, albo-strigillosi. *Folia* linearia vel lineari-oblanceolata, apice subacuta vel rotundata, mucronata, basi obtusa, 1–2 cm. longa, 2–4·5 mm. lata, brevissime petiolata, margine integro, subcoriacea, supra fere glabra, subtus indumento ut in caule, costa supra subconspicua subtus prominente, nervis obscuris. *Inflorescentiae* rami 4–8, corymbosim dispositi. *Racemi* circiter 8 cm. longi, laxiusculi ; bracteae parvae, persistentes ; pedicelli vix 3 mm. attingentes. *Calyx* bilabiatus, extus appresse flavo-hirsutus ; labium superius e lobis duobus oblongo-lanceolatis acutis 3·5 mm. longis 2·5 mm. latis, inferius e lobis tribus lanceolatis acutis 4·5 mm. longis 1 mm. latis. *Corolla* lutea (*ex Kerr*) ; vexillum reflexum, oblongum, apice emarginatum, 5·5 mm. longum, 5 mm. latum, basi squamis duabus 1 mm. longis et latis margine subintegro instructum, extus superne parce fulvo-hirsutum, ungui brevi albo-piloso-ciliato suffultum ; alae oblongae, 5 mm. longae, 2 mm. latae, glabrae, foveolatae, ungui 1 mm. longo ; carina 4·5 mm. longa, 5 mm. lata, marginibus liberis albo-piloso-ciliatis, ungui 1 mm. longo. *Stamina* generis ; tubus circiter 2 mm. longus, filamentis longioribus subaequalis. *Ovarium* subsessile, 3 mm. altum, glabrum, 8-ovulatum ; stylus 4·5 mm. longus, parce

pilosus. *Legumen* oblongum, sessile, 1 cm. longum, 4 mm. latum, apice truncatum, calyce stylique basi persistentibus.

Wang Djao, *Hosseus*, 59; Chiengmai, in eng jungle on Doi Sootep, 300–600 m., *Kerr*, 839. (Herb. Kew, Mus. Brit. et Calcutta.)

Crotalaria medicaginea, *Lamk.*—F.B.I., ii. p. 81.

Meh Ping Rapids, Ban Kan, 180 m., *Kerr*, 908; Sea shore, Cape Liant, *Murton*, 36.

Distr. India, China.

Crotalaria neriifolia, *Wall.*—F.B.I., ii. p. 74; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 39; Prain, Journ. As. Soc. Beng., lxvi. p. 352.

Chiengmai, Doi Sootep, 300–700 m., *Kerr*, 829, *Hosseus*, 287.

Distr. Burma.

Crotalaria peguana, *Benth. ex Baker*, F.B.I., ii. p. 77.

Chiengmai, Doi Sootep, 1350 m., *Kerr*, 784, *Hosseus*, 209.

Distr. Upper Burma.

Closely allied to, and possibly identical with, *C. Kurzii*, Baker.

Crotalaria sessiliflora, *Linn.*—F.B.I., ii. p. 73; Prain, Journ. As. Soc. Beng., lxvi. p. 351.

Chiengmai, in mixed jungle on Doi Sootep, 300–540 m., *Kerr*, 898; Wang Djao, *Hosseus*, 112.

Distr. Himalaya, China, Burma, Philippines.

Crotalaria striata, *DC.*—F.B.I., ii. p. 84. *C. Saltiana*, Prain, Journ. As. Soc. Beng., lxvi. p. 353, *non* Andr. *C. siamica*, Williams, Bull. Herb. Boiss., v. (1905) p. 20.

Bangkok, *Zimmermann*, 135.

Distr. Tropics.

Crotalaria verrucosa, *Linn.*—F.B.I., ii. p. 77.

Meh Ping Rapids, Ban Kan, 180 m., *Kerr*, 910.

Distr. Tropics.

Indigofera endecaphylla, *Jacq.*—F.B.I., ii. p. 98; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 39.

Anhin, *Schomburgk*, 258.

Distr. India, Burma, China, Africa.

Indigofera linifolia, *Retz.*—F.B.I., ii. p. 93; Prain, Journ. As. Soc. Beng., lxvi. p. 355.

Cape Liant, *Murton*, 35.

Distr. Afghanistan, India, Burma, China, Malaya, Australia, Africa.

Indigofera pulchella, *Roxb.*—F.B.I., ii. p. 101; For. Fl. Burma, i. p. 361; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 39.

Ban Meh Wang, 300 m., *Hosseus*, 362, *Kerr*, 1006.

Distr. N. India, Burma, China.

Indigofera siamensis, *Hosseus*, Fedde Repert. Nov. Sp., iv. (1907) p. 291.

Wang Djao, *Hosseus*, 120.

Indigofera sootepensis, *Craib*, sp. n., affinis *I. galegoidi*, DC., a qua ramorum foliorumque novorum indumento brunneo haud albo, foliolis numerosioribus, bracteis stipulisque longioribus, legumine fere dimidio breviore turgidiore differt.

Frutex ad 2·5 m. altus (*ex Kerr*). *Rami* flexuosi, subangulati, juventute dense brunneo-pubescentes, mox parce brevissime appresse strigillosi, cortice brunneo. *Folia* 15–18 cm. longa, petiolo ad 1 cm. longo, rachi supra canaliculato ; stipulae e basi fere 1 mm. lata longe attenuatae, ad 12 mm. longae ; foliola 37–41, opposita nisi infima subopposita, anguste oblonga, vel terminalia obovata, apice rotundata, mucronata, basi rotundata vel terminalia cuneata, 1·5–3 cm. longa, 6–8 mm. lata, tenuiter chartacea, utrinque parce pubescentia, margine integro, nervo primario utrinque conspicuo, nervis lateralibus obscuris, supra fusca subtus pallide viridia ; stipellae minutae ; petioluli circiter 2 mm. longi. *Racemi* axillares, usque ad apices ramorum, multiflori, ad 9 cm. longi, pedunculo 1 cm. longo. *Flores* breviter pedicellati, bracteis deciduis alabastra superantibus. *Calyx* fere 2 mm. longus, dentibus parvis, dense strigillosus. *Corolla* longe exserta, circiter 1 cm. longa, vexillo carinaque extus dense brunneo-strigillosis. *Legumen* teres, ad 4·5 cm. longum, 5 mm. diametro, basi attenuatum, parce puberulum.

Chiengmai, in deciduous jungle on Doi Sootep, 480–900 m., *Kerr*, 684.

Indigofera squalida, *Prain*, Journ. As. Soc. Beng., lxvi. p. 355.

Chiengmai, in deciduous jungle on Doi Sootep, 480 m., *Kerr*, 658.

Distr. Upper Burma.

Tephrosia purpurea, *Pers.*—F.B.I., ii. p. 112.

Chiengmai, on waste ground, 300 m., *Kerr*, 710 ; Anhin, *Schomburgk*, 253.

Distr. S. E. Asia, S. Africa.

Millettia auriculata, *Baker*, var. **extensa**, *Benth.*—Prain, Journ. As. Soc. Beng., lxvi. p. 363. *M. extensa*, Benth.—F.B.I., ii. p. 109 ; For. Fl. Burma, i. p. 352.

Chiengmai, Doi Sootep, 450–750 m., *Kerr*, 595.

Distr. (of var.) Burma.

Millettia Brandisiana, *Kurz*—F.B.I., ii. p. 108 ; For. Fl. Burma, i. p. 355 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 40.

Near Ban Meh Tah, 300 m., *Kerr*, 985 ; *Siam Forest Service*, 147.

Distr. Burma.

The material of *Hosseus*, 140, is rather scanty in Herb. Kew but it is evidently allied to this species.

Millettia ovalifolia, *Kurz*—F.B.I., ii. p. 107 ; For. Fl. Burma, i. p. 356.

Siam, *Teysmann*, 6026 in Herb. Bog.

Distr. Burma.

Sesbania aculeata, *Pers.*—F.B.I., ii. p. 114 ; Prain, Journ. As. Soc. Beng., lxvi. p. 369 ; Williams, Bull. Herb. Boiss., v. (1905) p. 20.

Chiengmai, in marshy ground, 300 m., *Kerr*, 811.

Distr. Tropics.

Sesbania grandiflora, *Pers.*—F.B.I., ii. p. 115 ; For. Fl. Burma, i. p. 362 ; Prain, Journ. As. Soc. Beng., lxvi. p. 370 ; Williams, Bull. Herb. Boiss., v. (1905) p. 20.

Chiengmai, near villages, 300 m., *Kerr*, 964.
Distr. India, Malaya, Australia, Mascarene Is.
Lao name, Dauk Kaa.

Aeschynomene indica, *Linn.*—F.B.I., ii. p. 151.
Chiengmai, in marshy ground, 300 m., *Kerr*, 768.
Distr. Tropics.

Desmodium auricomum, *Grah.*—F.B.I., ii. p. 172.
Raheng, *Lindhard*, 26.
Distr. Martaban, Tenasserim.

Desmodium capitatum, *DC.*—F.B.I., ii. p. 170 ; Prain, Journ. As. Soc. Beng., lxvi. p. 400. *D. polycarpum*, Williams, Bull. Herb. Boiss., v. (1905) p. 20 e.p. *non* DC.
Bangkok, *Zimmermann*, 57.
Distr. Ceylon, Burma, Malaya, Philippines.

Desmodium cephalotes, *Wall.*, var. **typica**, *Prain*, Journ. As. Soc. Beng., lxvi. p. 389. *D. cephalotes*, Wall.—F.B.I., ii. p. 163 e.p.
Siam Forest Service, 117.
Distr. India (rare), Burma, China, Tonkin, Java.

Desmodium Griffithianum, *Benth.*—F.B.I., ii. p. 171 ; Prain, Journ. As. Soc. Beng., lxvi. p. 400.
Chiengmai, 800 m., *Hosseus*, 253.
Distr. Khasia, Burma.

Desmodium gyrans, *DC.*—F.B.I., ii. p. 174.
Chiengmai, in eng jungle on Doi Sootep, 300–540 m., *Kerr*, 816 ; Kan Phra Dang, *Hosseus*, 156.
Distr. India, Burma, China, Malay Archipelago, Philippines.

Desmodium gyroides, *DC.*—F.B.I., ii. p. 175 ; Prain, Journ. As. Soc. Beng., lxvi. p. 401.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 745.
Distr. India, throughout Indo-China, Malaya.

Desmodium insigne, *Prain*, Journ. As. Soc. Beng., lxvi. p. 398.
Wang Djao, *Hosseus*, 61.
Distr. Tenasserim.

✓ **Desmodium Kurzii**, *Craib*, nom. nov. *D. grande*, Kurz—F.B.I., ii. p. 162 ; For. Fl. Burma, i. p. 384 ; Prain, Journ. As. Soc. Beng., lxvi. p. 389, *non* E. Mey.
Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 766.
Distr. Burma.

Desmodium laxiflorum, *DC.*—F.B.I., ii. p. 164.
Wang Djao, *Hosseus*, 95.
Distr. Himalayas, Assam, Burma, China, Malay Archipelago, Philippines.

* **Desmodium longipes**, *Craib*, Kew Bull., 1910 p. 20. *D. elegans*, Drake, Journ. de Bot., v. p. 189, *non* Benth.
Chiengmai, in mixed jungle on Doi Sootep, 300 m., *Kerr*, 715.
Distr. Tonkin, Cambodia.

Desmodium oblatum, *Baker*—F.B.I., ii. p. 166 ; Prain, Journ. As. Soc. Beng., lxvi. p. 394.
Chiengmai, Doi Sootep, 1000–1020 m., *Kerr*, 873, *Hosseus*, 234.
Distr. Burma.

Desmodium oblongum, *Wall.*—F.B.I., ii. p. 166 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 43 ; Prain, Journ. As. Soc. Beng., lxvi. p. 394.

Chiengmai, Doi Sootep, 510–1500 m., *Kerr*, 877, 894, *Hosseus*, 258 ; Kan Phra Dang, *Hosseus*, 154.

Distr. Burma, Manipur, Yunnan.

Desmodium polycarpum, *DC.*—F.B.I., ii. p. 171 ; Prain, Journ. As. Soc. Beng., lxvi. p. 400.

Chiengmai, in deciduous jungle on Doi Sootep, 720 m., *Kerr*, 729 ; Wang Djao, *Hosseus*, 128.

Distr. India, China, throughout Indo-China, Malaya, Africa.

Desmodium polycarpum, *DC.*, var. **angustfolia**, *Benth. MSS.*

Chiengmai, in eng jungle on Doi Sootep, 600 m., *Kerr*, 772.

Distr. Tavoy (*Wall. Cat.* 5729 K in Herb. Kew).

Desmodium pulchellum, *Benth.*—F.B.I., ii. p. 162 ; For. Fl. Burma, i. p. 383.

Wang Djao, *Hosseus*, 66.

Distr. E. Asia.

Desmodium sambuense, *DC.*—Prain, Journ. As. Soc. Beng., lxvi. p. 394. *D. floribundum*, Don—F.B.I., ii. p. 167 ; For. Fl. Burma, i. p. 387 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 43.

Chiengmai, in open grassy jungle on Doi Sootep, 1200–1350 m., *Kerr*, 782.

Distr. Punjab to Khasia, Upper Burma, China.

Desmodium trichocaulon, *DC.* *D. polycarpum*, DC., var. *trichocaulon*, Baker, F.B.I., ii. p. 172.

Chiengmai, in open grassy jungle on Doi Sootep, 1350 m., *Kerr*, 1308.

Distr. E. Himalayas, Khasia, Burma.

Desmodium triflorum, *DC.*—F.B.I., ii. p. 173 ; Prain, Journ. As. Soc. Beng., lxvi. p. 401.

Chiengmai, in a clearing on Doi Sootep, 720 m., *Kerr*, 794.

Distr. Tropics.

Uraria lagopoides, *DC.*—F.B.I., ii. p. 156 ; Prain, Journ. As. Soc. Beng., lxvi. p. 380.

Chiengmai, Doi Sootep, 390 m., *Kerr*, 650.

Distr. Bengal and Assam to S. China, Tonkin, Malaya.

Uraria latifolia, *Prain*, Journ. As. Soc. Beng., lxvi. p. 383.

Chiengmai, deciduous jungle on Doi Sootep, 420 m., *Kerr*, 1275.

Distr. Upper Burma.

Uraria macrostachya, *Wall.*—Prain, Journ. As. Soc. Beng., lxvi. p. 380.

Chiengmai, scrub jungle on Doi Sootep, 330 m., *Kerr*, 1330.

Distr. Burma, China.

Phylacium majus, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 44, cum tab. ; Prain, Journ. As. Soc. Beng., lxvi. p. 387.

Chiengmai, by a stream on Doi Sootep, 540 m., *Kerr*, 925.

Distr. Upper Burma.

Alysicarpus bupleurifolius, *DC.*—F.B.I., ii. p. 158.

Chiengmai, in eng jungle on Doi Sootep, 300–450 m., *Kerr*, 808 ; Wang Djao, *Hosseus*, 108 ; Ban Tang, *Hosseus*, 703.
Distr. Tropical Asia and Africa.

Lespedeza parviflora, *Kurz*, For. Fl. Burma, i. p. 381 ; F.B.I., ii. p. 144 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 45.
Chiengmai, Doi Sootep, 300–1500 m., *Kerr*, 951, *Hosseus*, 288.
Distr. Upper Burma.

Abrus cantoniensis, *Hance*, var. **Hossei**, *Craib*, var. nov., a typo foliolis rigidioribus numerosioribus utrinque usque ad 15, legumine paulo latiore, apice vix tam obliquo distinguenda.
Kan Phra Dang, 320 m., *Hosseus*, 155.
This plant has not as yet been collected by Dr. Kerr, and although the single specimen preserved in Herb. Kew differs from typical *A. cantoniensis* in the points noted, a more complete set of specimens is necessary to form a definite opinion as to its exact relationship to *A. cantoniensis*.
There is another species of *Abrus* (?) represented at Kew collected by Dr. Kerr at Chiengmai (No. 588), and again by the officers of the Siamese Forestry Department (No. 157), which is quite distinct, most notably in its leaflets, which are large for the genus, but in the absence of fruit I hesitate to refer it definitely to this genus.

Clitoria macrophylla, *Wall.*—F.B.I., ii. p. 209.
Chiengmai, in deciduous jungle on Doi Sootep, 390 m., *Kerr*, 645.
Distr. Burma.

Clitoria mariana, *Linn.*—F.B.I., ii. p. 208.
Chiengmai, Doi Sootep, 1200–1650 m., *Kerr*, 671.
Distr. Khasia, Burma, Yunnan, America.

Clitoria ternatea, *Linn.*—F.B.I., ii. p. 208 ; Williams, Bull. Herb. Boiss., v. (1905) p. 21.
Bangkok, *Zimmermann*, 5, 15, 156.
Distr. Tropics.

Dumasia villosa, *DC.*, var. **leiocarpa**, *Baker*, F.B.I., ii. p. 183 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 47.
Chiengmai, Doi Sootep, 1200–1650 m., *Kerr*, 883, *Hosseus*, 205.
Distr. Sikkim, Khasia, Burma, Ceylon.

Shuteria hirsuta, *Baker*, F.B.I., ii. p. 182 ; Prain, Journ. As. Soc. Beng., lxvi. p. 402 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 47. *Pueraria anabaptista*, Kurz.
Chiengmai, Doi Sootep, 1000 m., *Hosseus*, 232 ; Ban Meh Tah, 300 m., *Kerr*, 998 ; Raheng, *Lindhard*, 51.
Distr. Sikkim, Khasia, Burma, Yunnan, Sumatra.
For uniformity with F.B.I., l.c., I refer this plant to *Shuteria*, but it would probably be more satisfactory to follow Kurz, and place it in *Pueraria*.

Erythrina lithosperma, *Miq.*—F.B.I., ii. p. 190 ; For. Fl. Burma, i. p. 367 ; Prain, Journ. As. Soc. Beng., lxvi. p. 411.
Mountains between Lampoon and Lakon, 450 m., *Kerr*, 969 ; Doi Chieng Dao, 500 m., *Hosseus*, 419.
Distr. Burma, Malaya.

Erythrina suberosa, *Roxb.*—F.B.I., ii. p. 189 ; For. Fl. Burma, i. p. 369 ; Prain, Journ. As. Soc. Beng., lxvi., p. 410.

Near Pang Pooey, 420 m., *Kerr*, 1001.
Distr. India.

Apios carnea, *Benth.*—F.B.I., ii. p. 188 ; Prain, Journ. As. Soc. Beng., lxvi. p. 410.
Chiengmai, in evergreen jungle on Doi Sootep, 1500 m., *Kerr*, 881.
Distr. Nepaul, Khasia, Upper Burma (ex Prain, l.c.), (Yunnan ?).

Butea superba, *Roxb.*—F.B.I., ii. p. 195 ; For. Fl. Burma, i. p. 365.
Lakon, Palat, 300 m., *Kerr*, 1009.
Distr. Bengal, Burma.
Lao name, Mai Kwou Krena.

Spatholobus Roxburghii, *Benth.*—F.B.I., ii. p. 193 ; Prain, Journ. As. Soc. Beng., lxvi. p. 412. *Butea parviflora*, Roxb.—For. Fl. Burma, i. p. 365.
Chiengmai, in eng jungle on Doi Sootep, 450 m., *Kerr*, 723.
Distr. India, Burma, Assam, Yunnan.

Grona Grahami, *Benth.*—F.B.I., ii. p. 191 ; Prain, Journ. As. Soc. Beng., lxvi. p. 411.
Chiengmai, in eng jungle on Doi Sootep, 300–600 m., *Kerr*, 837.
Distr. Bengal (ex Prain, l.c.), Burma.

* **Pueraria alopecuroides**, *Craib*, Kew Bull. 1910, p. 276.
Hills between Muang Prow and Chieng Dao, 600 m., *Kerr*, 1044.
Distr. Yunnan, Upper Burma.
According to Dr. Kerr, the standard is white, with a yellow spot at the base, and the keel is purple.

Pueraria Candollei, *Grah.*—F.B.I., ii. p. 197 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 47 ; Prain, Journ. As. Soc. Beng., lxvi. p. 419.
Near Muang Prow, 300 m., *Kerr*, 992.
Distr. Andaman Is. (ex Prain, l.c.), Burma.

Pueraria siamica, *Craib*, sp. n., ab affini *P. Collettii*, Prain, foliolis acuminatis acutis, stipellis duplo longioribus, racemis gracilioribus longioribus haud tam densis, pedicellis sub anthesin gracilibus calyce longioribus distincta.

Herba scandens ; ramuli 3 mm. diametro, molliter albo-tomentelli. *Folia* pinnatim trifoliolata ; petioli 4–7 cm. longi, supra canaliculati, indumento ut in ramulis ; foliola ovata, apice acuminata acuta, basi terminalia cuneata, lateralia obliqua rotundata, 9–14 cm. longa, 4–6·5 cm. lata, margine integro, chartacea, supra hispidula, subtus molliter pubescentia, nervis lateralibus utrinque 5–6 cum nervulis supra conspicuis subtus prominentibus ; petioluli ad 4 mm. longi ; foliola terminalia a lateralibus 2–3·2 cm. distantia ; stipellae ad 6 mm. longae. *Racemi* solitarii axillares vel ad apices ramulorum paniculati, graciles, ad 32 cm. longi, nodis basalibus 2·5–3·5 cm., intermediis ad 1·5 cm. distantibus ; bracteae lanceolatae, acutae, 2 mm. longae ; pedicelli graciles ad 3·5 mm. longi. *Calycis* lobi 1 mm. longi, duo supremi in unum connati, tubus 2 mm. longus. *Corolla* purpurea, longe exserta ; vexillum amplum, reflexum, emarginatum, basi auriculatum, 4·5 mm. longum, 6 mm. latum, ungui circiter 2 mm. longo ; alae oblongo-obovatae, basi appendiculatae, 5·5 mm. longae, 2·5 mm. latae, ungui 2·5 mm. longo ; carina obtusa, 4 mm. longa, 2 mm. lata, ungui 2·5 mm. longo. *Stamen* vexillare

ima basi liberum, medio cum ceteris connatum ; antherae uniformes. *Ovarium* 3 mm. altum, 9 ovulatum, stylo glabro.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 831.

Pueraria Wallichii, *DC.*—F.B.I., ii. p. 197 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 47 ; Prain, Journ. As. Soc. Beng., lxvi. p. 419.

Chiengmai, Doi Sootep, 1000–1700 m., *Kerr*, 878, *Hosseus*, 207.

Distr. E. Himalayas, Burma, Yunnan.

Cruddasia insignis, *Prain*, Journ. As. Soc. Beng., lxvii. p. 287.

Chiengmai, in open jungle on top of Doi Sootep, 1500–1650 m., *Kerr*, 727.

Distr. Upper Burma.

Dysolobium dolichoides, *Prain*, Journ. As. Soc. Beng., lxvi. p. 427 ? *Vigna dolichoides*, Baker, F.B.I., ii. p. 206. *Vigna vexillata*, Williams, Bull. Herb. Boiss., v. (1905) p. 22, *non* Benth.

Bangkok, *Schomburgk*, 300.

Distr. Bengal, Assam, Burma.

Schomburgk's plant differs from the specimens in Herb. Kew referred to this species in having the leaflets occasionally trilobed—a not uncommon occurrence in this section of the *Phaseoleae*. There is no trace on the herbarium sheet of the name *Pueraria phaseoloides*, which, according to Williams, l.c., had been erroneously given to this plant, but in any case the name he suggests is also applicable.

Dolichos falcatus, *Klein* ?—F.B.I., ii. p. 211 ; Prain, Journ. As. Soc. Beng., lxvi. p. 430.

Chiengmai, in eng jungle, 540 m., *Kerr*, 834 ; Wang Djao, *Hosseus*, 45.

Distr. India, Burma, China.

Dunbaria fusca, *Kurz*—Prain, Journ. As. Soc. Beng., lxvi. p. 434. *Phaseolus fuscus*, Wall.—F.B.I., ii. p. 204.

Chiengmai, Doi Sootep, 900 m., *Kerr*, 813.

Distr. Upper Burma, China.

* **Dunbaria longeracemosa**, *Craib*, Kew Bull. 1910, p. 277.

Chiengmai, Doi Sootep, *Kerr*, 917 ; Kan Phra Dang, *Hosseus*, 148.

Dunbaria podocarpa, *Kurz*—F.B.I., ii. p. 218. *Vigna retusa*, Williams, Bull. Herb. Boiss., v. (1905) p. 21, ?, *non* Walp.

Chiengmai, evergreen jungle on Doi Sootep, 750–1050 m., *Kerr*, 870 ; Nakontai, 600 m., *Hosseus*, 717 ; Siam (?), *Candler*.

Distr. Burma, China.

As this is the only plant belonging to this section collected by Candler, it may be the plant enumerated by Williams, l.c., as *Vigna retusa*. There is, however, no evidence on the sheet of the plant having been seen by Williams.

Atylosia barbata, *Baker*, F.B.I., ii. p. 216 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 48.

Doi Chieng Dao, 450 m., *Kerr*, 1050.

Distr. Throughout Indo-China, Malaya.

Atylosia crassa, *Prain*, Journ. As. Soc. Beng., lxvi. p. 45. *A. mollis*, Benth.—F.B.I., ii. p. 213 e.p. ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 48.

Chiengmai, mixed jungle on Doi Sootep, 330 m., *Kerr*, 945 ; Ban Djam, 360 m., *Hosseus*, 368.

Distr. India to foot of Himalayas, Burma, Assam, Tonkin, Java, Philippines.

Rhynchosia longipetiolata, *Hosseus*, Fedde Repert. Nov. Sp., iv. p. 291.

Kan Phra Dang, *Hosseus*, 150.

Eriosema chinense, *Vogel*—F.B.I., ii. p. 219 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 49.

Chiengmai, in eng jungle on Doi Sootep, 450 m., *Kerr*, 722.

Distr. S.E. Asia, Australia.

Flemingia bracteata, *Wight*—For. Fl. Burma, i. p. 372 ; Prain, Journ. As. Soc. Beng., lxvi. p. 437. *F. strobilifera*, var. *bracteata*, Baker, F.B.I., ii. p. 227.

Piang Pooey, 420 m., *Kerr*, 981.

Distr. India, Burma, Yunnan.

Flemingia Chappar, *Ham.*—F.B.I., ii. p. 227 ; For. Fl. Burma, i. p. 371.

Ban Meh Chang, 300 m., *Kerr*, 980.

Distr. Bengal, Burma.

Flemingia ferruginea, *Ham.*—Prain, Journ. As. Soc. Beng., lxvi. p. 440. *F. congesta* Roxb., var. *Wightiana*, Baker, F.B.I., ii. p. 229, p.p.

Banks of Meh Ping, opposite Ban Salu, *Hosseus*, 381.

Distr. Burma.

Flemingia Kerrii, *Craib*, sp. n., affinis *F. congestae*, Roxb., sed bracteis parvis, floribus haud tam congestis, calycis brevioris indumento parciore, eiusque lobis supremis alte connatis, corolla longe exserta, legumine minore distincta.

Fruticulus 1·5 m. altus (*ex Kerr*) ; ramuli primo sub-triangulares mox teretes, glabrescentes, cortice rubro-brunneo striato obtecti. *Folia* trifoliolata ; petioli 3–5 cm. longi, alati, parce pilosi ; stipulae subpersistentes, lineari-lanceolatae, acuminatae, acutae, 8 mm. longae, 2 mm. latae ; foliola elliptica vel oblongo-elliptica, apice acuminata, mucronata, basi terminalia cuneata, lateralia obliqua subrotundata, 6–10 cm. longa, 2·5–5 cm. lata, margine integro, chartacea, supra breviter puberula subtus nervis pilulosa, nervis lateralibus utrinque circiter 7 [pseudo-trinervia ob nervos basales valde obliquos], supra conspicuis subtus cum nervulis prominulis ; petioluli vix 5 mm. longi, brunneo-tomentelli. *Racemi* 1·5–3 cm. longi ; bracteae parvae, ovatae, acutae, vix 2 mm. longae. *Calyx* extus breviter sericeus, intus lobis praecipue imperfecte sericeus praetereaque extus loborum margines versus dense rubro-glandulosus ; tubus 1·75 mm. longus ; lobus infimus 4 mm. longus, lobi laterales 2·5 mm. longi, duo supremi in unum apice bifidum connati, omnes lanceolati vel late lanceolati, acuti. *Corolla* purpurea ; vexillum obovato-ellipticum, apice brevissime obtuseque acuminatum, basi appendiculatum, 7 mm. longum, 4 mm. latum, ungui circiter 1·5 mm. longo ; alae anguste oblongae, basi breviter appendiculatae, 5 mm. longae, 1·5 mm. latae, ungui 2 mm. longo ; carina obtusa, basi truncata, 5 mm. longa, 2·5 mm. lata, ungui 2·5 mm. longo. *Ovarium* vix 2 mm. altum,

stylo superne glabro. *Legumen* 1 cm. longum, 0·5 cm. diametro, puberulum.

Near Laken, in dry stream bed, 300 m., *Kerr*, 976.

Flemingia sootepensis, *Craib*, sp. n., affinis *F. semialatae*, Roxb., a qua racemis quam foliis brevioribus, calycis indumento breviore, lobis valde brevioribus, leguminibus oblongis angustioribus recedit.

Fruticulus vix 1 m. altus (*ex Kerr*); ramuli primo triangulares appresse brunneo-pubescentes mox fere glabri, cortice rubro-brunneo lenticellato obtecti. *Folia* trifoliolata; petioli 3–7 cm. longi, alati, glabrescentes; stipulae lineari-lanceolatae, acuminatae, acutae, 2 cm. longae, 3 mm. latae, caducae; foliola plerumque lanceolata, apice acuminata, mucronata, basi terminalia cuneata, lateralia obliqua rotundata, ad 19 cm. longa, 6·5 cm. lata, margine integro, chartacea, supra glabrescentia, subtus nervis puberula, nervis lateralibus utrinque circiter 6 supra conspicuis subtus prominulis; petioluli 3–5 mm. longi, fulvo-hirsuti. *Racemi* 2–10 cm. longi; bracteae ovato-lanceolatae, acuminatae, ad 6 mm. longae, 2 mm. latae. *Calyx* pilulosus, distincte nervatus; tubus 3 mm. longus; lobi lineari-lanceolati, acutissimi, laterales supremique 4 mm. longi, infimus paulo longior. *Corolla* alba; vexillum late ellipticum, basi auriculatum, 6 mm. longum, 4 mm. latum, ungui 2·5 mm. longo; alae oblongae, appendiculatae, 5 mm. longae, 1·5 mm. latae, ungui gracili circiter 3 mm. longo; carina obtusa, haud appendiculata, 5·75 mm. longa, 1·5 mm. lata, ungui gracili, 3 mm. longo. *Ovarium* vix 2 mm. altum. *Legumen* oblongum, styli basi persistente apiculatum, 1·3 cm. longum, 6 mm. latum.

Chiengmai, in evergreen jungle on Doi Sootep, 600–900 m., *Kerr*, 934, *Hosseus*, 309.

The nervation of the calyx tube is scarcely so distinct in the specimen collected by Hosseus as in that collected by Kerr and the racemes are slightly longer but it apparently belongs to this species.

Dalbergia cultrata, *Grah.*—F.B.I., ii. p. 233; For. Fl. Burma, i. p. 342; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 50; Prain, Ann. Roy. Bot. Gard. Calc., x. p. 55.

Chiengmai, Doi Sootep, 450 m., *Kerr*, 1075.

Distr. Burma.

Dalbergia Kerrii, *Craib*, sp. n., e grege *Canarum* affinis *D. Kurzii*, Prain, a qua foliolis formae diversae numerosioribus, stipulis magnis, legumine haud glabro vix reticulato differt.

Arbor ad 15 m. alta (*ex Kerr*); ramuli ad 7 mm. diametro, juventute fulvo-tomentelli, mox glabri, cortice striato vel irregulariter fisso obtecti. *Folia* pinnata, ad 16·5 cm. longa, rachi fulvo-tomentello; petioli 5 cm. longi; stipulae deciduae, lanceolatae, apice acutae, 14 mm. longae, 5 mm. latae. *Foliola* 15, oblonga, elliptica vel obovato-elliptica, apice breviter acuminata, obtusa, basi rotundata vel cuneata, 2–7 cm. longa, 1·4–2·3 cm. lata, chartacea, margine integra, ciliolata, supra glabra nisi nervis glabrescentibus, subtus fere glabra costa fulvo-tomentella excepta, nervis lateralibus utrinque circiter 7 intra marginem arcuatis utrinque conspicuis, nervis transversis uti reticulatione gracili subtus conspicuis. *Inflorescentia* ante folia evoluta, ex axillis veteribus, paniculis ad 11 cm. longis 17 cm. latis.

Pedunculi fulvo-tomentelli ; pedicelli graciles, circiter 3 mm. longi. *Calyx* campanulatus, 4 mm. longus, 4 mm. diametro, extra fere glaber ; dentes subaequales circiter 1·5 mm. longi, obtusi. *Corolla* longe exserta, glabra ; vexillum late ellipticum, apice emarginatum, basi cuneatum, reflexum, 6·5 mm. longum, 3 mm. latum ; alae oblongae, apice obtusae, basi hastatae, 4 mm. longae, 2 mm. latae, ungui 2 mm. longo ; carina alis subaequalis, basi hastata, ungui 2 mm. longo. *Ovarium* 3 mm. altum, 1 mm. latum, sparse pubescens, stipite 2·5 mm. longo, uniovulatum ; stylus subulatus 1·75 mm. longus, basi vix glaber. *Legumen* late ligulatum, apice rotundatum, apiculatum, basi cuneatum, 7–8 cm. longum, 2·2 cm. latum, breviter molliterque pubescens, haud conspicue reticulatum, stipite 5 mm. longo ut in legumine pubescente.

Muang Prow, Meh Kaut, 450 m., *Kerr*, 1033.

Lao name, Mai Ket.

Dalbergia rimosa, *Roxb.*—F.B.I., ii. p. 232 ; Prain, Ann. Roy. Bot. Gard. Calc., x. p. 38.

Chiengmai, Doi Sootep, 750 m., *Kerr*, 1096.

Distr. Sikkim, Assam, Burma, Yunnan, Tonkin.

Dalbergia stipulacea, *Roxb.*—F.B.I., ii. p. 237 p.p. ; For. Fl. Burma, i. p. 346 ; Prain, Ann. Roy. Bot. Gard. Calc., x. p. 102.

Chiengmai, Doi Sootep, 660–900 m., *Kerr*, 560, 1175.

Distr. Sikkim, Assam, Burma, Yunnan.

Dalbergia tamarindifolia, *Roxb.*—F.B.I., ii. p. 234 ; For. Fl. Burma, i. p. 348 ; Prain, Ann. Roy. Bot. Gard. Calc., x. p. 69.

Lem Tong Lan, *Murton*, 124.

Distr. India, Burma, China, Malaya, Philippines.

Dalbergia volubilis, *Roxb.*—F.B.I., ii. p. 235 ; For. Fl. Burma, i. p. 346 ; Prain, Ann. Roy. Bot. Gard. Calc., x. p. 100.

Lakon, Hooey Meh Tan, 360 m., *Kerr*, 1014.

Distr. India, Burma, Assam.

Lao name, Pi Pohng.

Pterocarpus macrocarpus, *Kurz*—F.B.I., ii. p. 239 ; For. Fl. Burma, i. p. 349.

Korat, 600–900 m., *Witt.*

Distr. Burma.

Vern. Mai Padouk (ex *Witt*).

Derris robusta, *Benth.*—F.B.I., ii. p. 241 ; For. Fl. Burma, i. p. 338 ; Prain, Journ. As. Soc. Beng., lxvi. p. 458.

Doi Chieng Dao, 350 m., *Hosseus*, 523.

Distr. India, Burma, Yunnan.

Caesalpinia digyna, *Rottl.*—F.B.I., ii. p. 256 ; For. Fl. Burma, i. p. 407 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 51 ; Williams, Bull. Herb. Boiss., v. (1905) p. 19.

Chiengmai, in scrub jungle on Doi Sootep, 300 m., *Kerr*, 806.

Distr. India, Malaya.

Caesalpinia minax, *Hance*, var. **burmanica**, *Prain*, Journ. As. Soc. Beng., lxvi. p. 469. *C. Morsei*, Dunn, Journ. Linn. Soc., xxxv. p. 492.

Chiengmai, in scrub jungle on banks of Meh Ping, 300 m., *Kerr*, 758.

Distr. Burma, China, Tonkin.

Caesalpinia Sappan, *Linn.*—F.B.I., ii. p. 255 ; For. Fl. Burma, i. p. 405 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 51.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1262.
Distr. S.E. Asia.

Cassia alata, *Linn.*—F.B.I., ii. p. 264.
Bangkok, *Zimmermann*, 26.
Distr. Tropics.

Cassia Bakeriana, *Craib*, sp. n., a *C. nodosa*, Ham., calyce corollaque multo majoribus, a *C. javanica*, Linn., foliolorum magnitudine et forma, ab ambabus indumento recedit.

Folia 35·5 cm. longa, petiolo fulvo-puberulo tereti 4 cm. longo suffulta ; foliola utrinque 10, oblonga vel terminalia oblanceolata, apice acuta vel breviter acuminata, basi obliqua, cuneata, 6·3–8·5 cm. longa, 1·7–3 cm. lata, subchartacea, utrinque, subtus costa nervisque praecipue, densius pilulosa, nervis lateralibus utrinque circiter 10, supra vix conspicuis subtus prominulis, costa supra sicco impressa ; petioluli 2 mm. longi. *Racemi* laterales (?), 4·5–7·5 cm. longi ; bracteae sub anthesin conspicuae, lanceolatae, apice acutae, ad 1 cm. longae, 3 mm. latae, utrinque pilulosae. *Pedicelli* 6 cm. attingentes, sulcati, pilulosi. *Calycis* lobi lanceolati vel ovato-lanceolati, obtusiusculi, 0·9–1·2 cm. longi, 2–3 mm. lati, utrinque ut in bracteis pilulosi. *Petala* subaequalia, lanceolata, oblongo-lanceolata vel ovato-lanceolata, acutiuscula, 3·5–4·5 cm. longa, 1·2–2·5 cm. lata, utrinque pilulosa, basi in unguem 0·5 cm. longum contracta. *Stamina* omnia fertilia, 3 alia longe superantia eorumque filamentis medio incrassatis, filamentis glabris. *Ovarium* longe stipitatum, arcuatum, albo-pubescens, stylo brevi apice incurvo.
Chiengmai, Doi Sootep, 1000–1500 m., *Hosseus*, 478.
To this species probably belongs Griffith's Prome Hill specimen (Kew Distr., 1909) mentioned in Flora of British India by Mr. Baker as a variety of *C. javanica* or a new species.

Cassia Fistula, *Linn.*—F.B.I., ii. p. 261 ; For. Fl. Burma, i. p. 391 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 51.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1194 ; Bangkok, *Zimmermann*, 60.
Distr. India, China, Malaya—often planted in Tropics.

Cassia glauca, *Lamk.*—F.B.I., ii. p. 265.
Raheng, *Hosseus*, 170.
Distr. S. E. Asia—often planted.

Cassia Leschenaultiana, *DC.*—Prain, Journ. As. Soc. Beng., lxvi. p. 477. *C. mimosoides*, Linn., var. *Wallichii*, Baker, F.B.I., ii. p. 266.
Chiengmai, *Hosseus*, 257.
Distr. India, Burma, Malaya.

Cassia mimosoides, *Linn.*—F.B.I., ii. p. 266 ; Prain, Journ. As. Soc. Beng., lxvi. p. 477.
Wang Djao, *Hosseus*, 129.
Distr. S.E. Asia.

Cassia occidentalis, *Linn.*—F.B.I., ii. p. 262 ; Prain, Journ. As. Soc. Beng., lxvi. p. 474 ; Williams, Bull. Herb. Boiss., v. (1905) p. 19.

Chiengmai, on waste ground, 300 m., *Kerr*, 759.
Distr. Tropics.

Cassia pumila, *Lamk.*—F.B.I., ii. p. 266.
Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 840.
Distr. Tropical Asia, N. Australia.

Cassia siamea, *Lamk.*—F.B.I., ii. p. 264 ; Williams, Bull. Herb. Boiss., v. (1905) p. 19.
Siam Forest Service, 135 ; Ban Takilek, 300 m., *Hosseus*, 321.
Distr. India, Malaya.
Hosseus 321 in Herb. Kew consists of leaves only but is apparently this species.

Cassia Sophera, *Linn.*—F.B.I., ii. p. 262.
Bangkok, *Zimmermann*, 14.
Distr. Tropics.

Cassia timoriensis, *DC.*—F.B.I., ii. p. 265 ; For. Fl. Burma, i. p. 393.
Chiengmai, in scrub jungle on Doi Sootep, 300 m., *Kerr*, 797 ; Wang Djao, *Hosseus*, 86.
Distr. India, throughout Indo-China, Malaya.

Cassia Tora, *Linn.*—F.B.I., ii. p. 263 e.p. ; Prain, Journ. As. Soc. Beng., lxvi. p. 475.
Chiengmai, on waste ground, 300 m., *Kerr*, 807 ; Raheng, *Hosseus*, 169 ; Bangkok, *Zimmermann*, 13.
Distr. S. E. Asia.

Bauhinia acuminata, *Linn.*—F.B.I., ii. p. 276 ; For. Fl. Burma, i. p. 397 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 51.
Chiengmai, mixed jungle on Doi Sootep, 300 m., *Kerr*, 610 ; Bangkok, *Zimmermann*, 144.
Distr. India, Burma, China, Malaya.

Bauhinia Blancoi, *Baker*, F.B.I., ii. p. 278. *B. coccinea*, Williams, Bull. Herb. Boiss., v. (1905) p. 18, *non* DC.
Anhin, *Schomburgk*, 286.
Distr. Philippines, Malay Archipelago.

Bauhinia bracteata, *Grah.*—F.B.I., ii. p. 282.
Gulf of Siam, *Finlayson* in Wall. Cat. 5802 in Herb. Kew.
Distr. Tenasserim.

Bauhinia Harmsiana, *Hosseus*, Fedde Repert. Nov. Sp., iv. (1907) p. 290.
Banks of Meh Ping Rapids up to Chiengmai, 135–300 m., *Kerr*, 507.

Bauhinia polycarpa, *Wall.*—For. Fl. Burma, i. p. 397 ; F.B.I., ii. p. 276 ; Prain, Journ. As. Soc. Beng., lxvi. p. 495. *B. baviensis*, Drake, Journ. de Bot., v. p. 217.
Chiengmai, mixed jungle on Doi Sootep, 360 m., *Kerr*, 1247 ; *Siam Forest Service*, 136.
Distr. Burma, Tonkin.
Kerr remarks that the flowers are pale green.

Bauhinia purpurea, *Linn.*—F.B.I., ii. p. 284 ; For. Fl. Burma, i. p. 398.

Raheng, 120 m., *Kerr*, 914 ; Salween, Mg. Youam, *Witt* ; *Siam Forest Service*, 137.

Distr. India, Burma, China, Singapore,—often cultivated.

Bauhinia unguiculata, *Baker*, F.B.I., ii. p. 277.

Anhin, *Schomburgk*, 241.

Bauhinia variegata, *Linn.*—F.B.I., ii. p. 284 ; For. Fl. Burma, i. p. 397 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 51.

Chiengmai, Doi Sootep, 330–360 m., *Kerr*, 525 ; Doi Chieng Dao, *Hosseus*, 407, 471.

Distr. India, Burma, China.

Afzelia siamica, *Craib*, sp. n., a speciebus indicis adhuc descriptis foliolis usque 5-jugis, staminibus 7, floribus majusculis recedit.

Arbor alta, ramis patentibus, ramulis gracilibus teretibus juventute puberulis cortice virido-brunneo lenticelloso obtectis. *Folia* 16–26 cm. longa, glabra, petiolis basi incrassatis 2·5–3 cm. longis suffulta ; foliola 3–5-juga, oblonga, apice obtusa, emarginata, basi rotundata vel truncata, 4–9 cm. longa, 3·5–4·5 cm. lata, supra viridia, subtus pallidiora vel glauca, chartacea, margine integro leviter cartilagineo, nervis lateralibus utrinque numerosis, intra marginem arcuatis cum nervulis utrinque conspicuis ; petioluli 3–4 mm. longi, rugosi. *Racemi* terminales et axillares, simplices vel interdum e basi simpliciter ramosi. *Pedicelli* ad 1 cm. longi, ut in calyce bracteisque albo-tomentosi ; bracteae ovato-oblongae, apice acutiusculae, 9 mm. longae, 4 mm. latae, ante anthesin deciduae ; bracteolae bracteis similes sed tomentellae et sub anthesin subpersistentes. *Calycis* tubus superne leviter dilatatus, vix 1 cm. longus, medio 2·5 mm. diametro ; lobi 4, virides, oblongi, subaequales, usque ad 1·5 cm. longi, 1·1 cm. lati. *Petalum* unum roseum ; unguis 1 cm. longus, intus basin versus parce lanatus ; limbus subrotundatus, 9 mm. longus, 8 mm. latus, apice emarginatus, extus medio pubescens. *Stamina* 7 ; filamenta 3–3·5 cm. longa, apicem versus attenuata, basi parce pubescentia ; staminodia 3, quorum duo circiter 1 cm. longa, tertium 3 mm. longum, omnia inferne pubescentia. *Ovarium* stipitatum, suturis et stipe lanatum ; stylus glaber, vix 3 cm. longus. *Legumen* oblongum, 18 cm. longum, 7·5 cm. latum, valvis lignosis 7 mm. crassis.

Chiengmai, Ban Meh Sah, by streams, 330 m., *Kerr*, 1068.

Sindora siamensis, *Teysm. ex Miq.*—Prain, Journ. As. Soc. Beng., lxvi. p. 481. *S. Wallichii*, var. *siamensis*, Baker, F.B.I., ii. p. 268. *S. Wallichii*, Williams, Bull. Herb. Boiss., v. (1905) p. 18.

Korat, 60–90 m., *Witt* ; Ratbouri, *Teysmann*, 6050.

By a slip Williams, l.c., quotes the Ratbouri plant as having been collected by Dr. Wallich.

Neptunia oleracea, *Lour.*—F.B.I., ii. p. 285 ; Williams, Bull. Herb. Boiss., v. (1905) p. 18.

Chiengmai, 300 m., *Kerr*, 841.

Distr. Tropics.

Lao name, Puk Naung.

Leucaena glauca, *Benth.*—F.B.I., ii. p. 290 ; Williams, Bull. Herb. Boiss., v. (1905) p. 18.

Bangkok, *Zimmermann*, 166 ; Paknampo, *Witt*, 10.

Distr. Tropics.

* **Xylia Kerrii**, *Craib et Hutchinson*, Kew Bull., 1909, p. 357; Hook. Ic. Plant., tab. 2932.

Chiengmai, in deciduous jungle at foot of Doi Sootep, 330 m., *Kerr*, 547.

Distr. Burma.

Acacia Catechu, *Willd.*—F.B.I., ii. p. 295; For. Fl. Burma, i. p. 422; Prain, Journ. As. Soc. Beng., lxvi. pp. 508, 509.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1230.

Approaches the form *catechuoides* (Benth. sp.), but the calyx and corolla are never absolutely glabrous.

Lao name, Sia Siat.

Acacia pennata, *Willd.*, var. **arrophula**, *Baker*, F.B.I., ii. p. 297; Prain, Journ. As. Soc. Beng., lxvi. p. 510.

Chiengmai, foot of Doi Sootep, 300 m., *Kerr*, 720.

Distr. E. Himalayas, Burma.

Albizzia Lebbek, *Benth.*—F.B.I., ii. p. 298; For. Fl. Burma, i. p. 427.

Bangkok, *Zimmermann*, 157.

Distr. Tropics—often planted.

Albizzia lebbekoides, *Benth.*—Prain, Journ. As. Soc. Beng., lxvi. p. 513.

Wat Mai, *Hosseus*, 1.

Distr. Upper Burma, Malay Archipelago.

Albizzia myriophylla, *Benth.*—F.B.I., ii. p. 300; Prain, Journ. As. Soc. Beng., lxvi. p. 515; Williams, Bull. Herb. Boiss., v. (1905) p. 17. *A. procera*, Williams, Bull. Herb. Boiss., v. (1905) p. 18, *non* Benth.

Anhin, *Schomburgk*, 268.

Distr. India, Burma, Malay Peninsula.

Pithecolobium angulatum, *Benth.*—F.B.I., ii. p. 306; For. Fl. Burma, i. p. 430; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 54.

Doi Chieng Dao, 520 m., *Kerr*, 1052; Chiengmai, Doi Sootep, 720 m., *Kerr*, 1072.

Distr. Throughout Indo-China, Malaya.

Pithecolobium glomeriflorum, *Kurz*—For. Fl. Burma, i. p. 430; Prain, Journ. As. Soc. Beng., lxvi. p. 517. *Albizzia glomeriflora*, Kurz—F.B.I., ii. p. 300.

Chiengmai, in evergreen jungle on Doi Sootep, 1200–1600 m., *Kerr*, 561, *Hosseus*, 506.

Distr. Burma.

Enterolobium Saman, *Prain*, Journ. As. Soc. Beng., lxvi. p. 252. *Pithecolobium Saman*, Benth.

Chiengmai, planted along roads, 300 m., *Kerr*, 573.

Introduced—a native of Guiana.

Rosaceae.

Prunus Hosseusii, *Diels*, Fedde Repert. Nov. Sp., iv. (1907) p. 289.

Chiengmai, Doi Sootep, 1650 m., *Hosseus*, 260.

More complete material is necessary to establish this as a species distinct from *P. Puddum*, Roxb.

Rubus ellipticus, *Smith*—F.B.I., ii. p. 336 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 54. *R. flavus*, Ham.—For. Fl. Burma, i. p. 438.

Chiengmai, Doi Sootep, 900 m., *Kerr*, 1119.

Distr. India, Burma, Philippines, China.

Rubus (Malachobatus) Kerrii, *Rolfe*, sp. n., ab affini *R. birmanico*, Hook. f., ramulis velutinis, stipulis floribusque minoribus recedit.

Ramuli petiolique velutini, aculeis sparsis brevibus uncinatis instructi. *Folia* quinque- vel obscure septem-loba, 5–8 cm. longa, 6–8 cm. lata, subcoriacea, denticulata, supra bullato-rugosa, glabra, venis hirsutis, subtus lacunoso-reticulata, griseo-tomentosa, in nervis hirsutula ; lobi deltoideo-ovati, praesertim intermedii paucidentati ; petioli 3–4 cm. longi. *Stipulae* bracteaeque ambitu oblongae, pectinatae, 0·6–1·2 cm. longae, velutinae. *Flores* in racemos breves axillares et terminales dispositi. *Pedicelli* 5 mm. longi. *Sepala* deltoideo-ovata, subobtusa, 5–6 mm. longa, velutina. *Petala* subsessilia, orbicularia vel latissime ovato-orbicularia, 4 mm. longa. *Stamina* numerosissima ; filamenta 3·5 mm. longa, glabra. *Carpella* numerosa, glabra ; styli 6–7 mm. longi, conferti, glabri.

Chiengmai, on edges of clearings on Doi Sootep, 720 m., *Kerr*, 648.

With the general facies of *R. birmanicus*, this species is very distinct in its pubescence, the texture and veining of its leaves, the shape of its stipules and bracts, and in its having smaller and more congested flowers.

Crassulaceae.

Bryophyllum calycinum, *Salisb.*—F.B.I., ii. p. 413.

Ban Muang Gang, 300 m., *Hosseus*, 363.

Distr. Tropics.

Droseraceae.

Drosera Burmanni, *Vahl*—F.B.I., ii. p. 424 ; Coll. et Hemsl Journ. Linn. Soc., xxviii. p. 57.

Chiengmai, *Hosseus*, 320, 463, 493, *Kerr*, 575.

Distr. Trop. Asia, Africa, and Australia.

Drosera peltata, *Sm.*, var. **lunata**, *C. B. Clarke*, F.B.I., ii. p. 425

Chiengmai, Doi Sootep, 1200–1650 m., *Kerr*, 673, *Hosseus*, 535.

Distr. India, Burma, China, Malaya.

Combretaceae.

Terminalia Chebula, *Retz.*—F.B.I., ii. p. 446 ; For. Fl. Burma, i. p. 456.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 665.

Distr. India, Burma.

***Terminalia mucronata**, *Craib et Hutchinson*, Kew Bull., 1909, p. 358.

Chiengmai, in deciduous jungle on Doi Sootep, 540 m., *Kerr*, 593.

Lao name, Mai Pooey.

Mo. Bot. Garden
1912

Terminalia tomentosa, *Bedd.*—F.B.I., ii. p. 447 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 57. *T. alata*, Roth.—For. Fl. Burma, i. p. 458.

Chiengmai, in deciduous jungle on Doi Sootep, 540 m., *Kerr*, 626.

Distr. India, Burma.

Calycopteris floribunda, *Lamk.*—F.B.I., ii. p. 449 ; For. Fl. Burma, i. p. 468 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 57.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 961 ; Ban Djam, 350 m., *Hosseus*, 366 ; Raheng, *Witt*, 23.

Distr. S. India, Burma, Assam, Malay Peninsula.

Anogeissus acuminata, *Wall.*, var. **lanceolata**, *C. B. Clarke*, F.B.I., ii. p. 451.

Near Lampoon, 300 m., *Kerr*, 965.

Distr. India, Burma.

Combretum deciduum, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 58. *C. ovale*, Kurz, For. Fl. Burma, i. p. 462, *non* R. Br.

Lakon, Pak Kaung Nai, 300 m., *Kerr*, 971 ; Doi Chieng Dao, 500 m., *Hosseus*, 461.

Distr. Burma.

Combretum extensum, *Roxb.*—For. Fl. Burma, i. p. 463 ; F.B.I., ii. p. 458.

Near Lampoon, in scrub jungle, 300 m., *Kerr*, 966.

Distr. India, Burma, Assam, Java, Philippines.

Myrtaceae.

Tristania rufescens, *Hance*, Journ. Bot., v. (1876) p. 259.

Chiengmai, Doi Sootep, 390–600 m., *Kerr*, 516, *Hosseus*, 423.

Distr. Phu-quoc.

Lao name, Mai Kău (ex *Kerr*).

Probably only a variety of *T. burmanica*, Griff. ex Duthie.

Psidium Guyava, *Linn.*—For. Fl. Burma, i. p. 476 ; F.B.I., ii. p. 468.

Bangkok, *Zimmermann*, 154.

Distr. Naturalised throughout India and Indo-China.

Eugenia balsamea, *Wight*—For. Fl. Burma, i. p. 485 ; F.B.I., ii. p. 499.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 920.

Distr. Sikkim, E. Bengal, Burma, Assam, Yunnan.

Eugenia formosa, *Wall.*—F.B.I., ii. p. 471 ; For. Fl. Burma, i. p. 492.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 545.

Distr. Burma, Bengal.

Eugenia fruticosa, *Roxb.*—F.B.I., ii. p. 499 ; For. Fl. Burma, i. p. 485.

Chiengmai, in mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 625.

Distr. Burma, Bengal.

Eugenia grata, *Wight*—F.B.I., ii. p. 486 ; For. Fl. Burma, i. p. 480.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 554.

Distr. Burma, Malaya, (China ?).

Eugenia Kurzii, *Duthie*, var. vel species nova ei valde affinis.
Chiengmai, Doi Sootep, 700–900 m., *Kerr*, 1091, *Hosseus*, 479.
These specimens appear to be intermediate between *E. Kurzii*, Duthie and *E. albiflora*, Duthie. *Zimmermann*, 160, from Bangkok, is also closely allied to these.
According to Kerr the Lao name of this plant and also of *E. fruticosa* is Mai Hah.

Barringtonia racemosa, *Roxb.*—F.B.I., ii. p. 507 ; For. Fl. Burma, i. p. 496.
Bangkok, *Schomburgk*, 211.
Distr. India, Burma, Tonkin, Cochinchina, Malaya.
By an oversight Williams, Bull. Herb. Boiss., iv. (1904) p. 1031, says that Schomburgk 211 was "not kept."

Careya arborea, *Roxb.*—For. Fl. Burma, i. p. 499 ; F.B.I., ii. p. 511.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1089.
Distr. India, Burma, Malaya.

Melastomaceae.

Osbeckia chinensis, *Linn.*—F.B.I., ii. p. 515.
Chiengmai, Doi Sootep, 360–600 m., *Kerr*, 827, 1302 ; Wang Djao, *Hosseus*, 133.
Distr. India, China, Burma, Malaya, N. Australia.

Osbeckia crinita, *Benth.*—F.B.I., ii. p. 517.
Chiengmai, Doi Sootep, 1200–1700 m., *Kerr*, 879 p.p., *Hosseus*, 188.
Distr. Sikkim, Bhotan, Khasia, Burma.

Osbeckia nepalensis, *Hook.*—F.B.I., ii. p. 521.
Chiengmai, Doi Sootep, 720–1000 m., *Kerr*, 749, *Hosseus*, 270.
Distr. Himalaya, Burma, China.

Osbeckia racemosa, *Craib*, sp. n., ab affini *O. rostrata*, Don, foliis majoribus longe petiolatis, inflorescentia racemosa haud paniculata differt.

Frutex usque ad 1·2 m. altus ; rami tetragoni, internodiis parce appresse setulosi, nodis setosi, cortice albido. *Folia* ovato-elliptica, lanceolato-elliptica vel elliptica, apice acuta vel vix acuminata, basi plerumque rotundata vel juniora cuneata, 13–20 cm. longa, 4·2–8·5 cm. lata, membranacea, supra distanter, subtus nervis tantum breviter setulosa, margine integro setoso-ciliato, e basi 7-nervia, nervis subtus prominentibus supra leviter impressis, nervulis utrinque, subtus magis, conspicuis ; petioli sicco rubescentes, foliorum oppositorum parum inaequales, 1–4 cm. longi, supra canaliculati, ut in ramis setosi. *Racemi* terminales, ad 10 cm. longi, rachi crasso nodoso. *Bracteae* sub anthesin deciduae, alabastra obtegentes, ovatae, apice obtusae vel subacutae, 2·2–2·3 cm. longae, 12–15 mm. latae, membranaceae, ciliatae. *Flores* 5·5 cm. diametro. *Calycis* setosi tubus 1·2 cm. longus, lobi 6 mm. longi. *Petala* obcordata, 3·3 cm. longa, 3 cm. lata, minute ciliata. *Stamina* 8 ; filamenta 1·5 cm. longa, glabra ; antherae arcuatae 1·5 cm. longae. *Fructus* pedicello usque ad 3·5 mm. longo suffultus, inferne ovoideus, apice in collum attenuatus, 1·3–1·6 cm. longus, 7 mm. diametro.

Chiengmai, by streams in evergreen jungle on Doi Sootep, 540 m., *Kerr*, 836.

Distr. Burma ; Maymyo (*Lace*, 4123).

Osbeckia stellata, *Wall.*—F.B.I., ii. p. 517.
Chiengmai, Doi Sootep, 1200–1500 m., *Kerr*, 879 p.p.
Distr. Himalaya, Bengal.

Osbeckia truncata, *Don*—F.B.I., ii. p. 514.
Wang Djao, *Hosseus*, 130 ; Raheng, *Lindhard*, 23.
Distr. India.

* **Sonerila Kerrii**, *Craib et Stapf*, Kew Bull., 1910, p. 22.
Chiengmai, in open jungle on Doi Sootep, 1320–1500 m., *Kerr*, 705.

Sonerila tenera, *Royle*—F.B.I., ii. p. 530. *S. stricta*, Hook., var. *burmanica*, C. B. Clarke, F.B.I., ii. p. 530 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 59.
Chiengmai, evergreen jungle on Doi Sootep, 660–1020 m., *Kerr*, 872.
Distr. N.W. India, Burma, China.
Stapf (Ann. Bot., vi. p. 305) rightly reduces *S. stricta*, var. *burmanica* to *S. tenera*. The variety is in no way related to *S. stricta*, and Kerr's specimens serve to connect this variety with typical *S. tenera*, the indumentum on the calyx and branches being denser and more persistent than in the type.

Memecylon pauciflorum, *Bl.*—For. Fl. Burma, i. p. 514 ; F.B.I., ii. p. 555.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 584.
Distr. Bengal, Burma, Timor, Australia.

Memecylon plebejum, *Kurz*—For. Fl. Burma, i. p. 513 ; F.B.I. ii. p. 561.
Chiengmai, in evergreen jungle on Doi Sootep, 960 m., *Kerr*, 1213.
Distr. Burma.

Lythraceae.

Ammannia baccifera, *Linn.*, 1a, aa, *Koehne*.
Siam, *Hosseus* (ex *Koehne*, Engl. Bot. Jahrb., xlii. Beibl. 97, p. 53).

Rotala diversifolia, *Koehne*, Engl. Bot. Jahrb., xli. p. 77.
Chiengmai, Doi Sootep, 750 m., *Hosseus*, 275.

Rotala mexicana, *Cham. et Schlech.*, var. **Chamissoana**, *Koehne*, f. **minima**, *Koehne*.
Siam, *Hosseus* (ex *Koehne*, Engl. Bot. Jahrb., xlii. Beibl. 97, p. 53).
Distr. E. India (ex *Koehne*).

Rotala rotundifolia, *Koehne*, Engl. Bot. Jahrb., i. p. 174. *Ammannia rotundifolia*, Ham.—F.B.I., ii. p. 566 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 60.
Chiengmai, Doi Sootep, 750–1050 m., *Hosseus*, 273, 491.
Distr. India, Burma, China, Formosa, Tonkin.

Lagerstroemia Balansae, *Koehne*, Engl. Bot. Jahrb., xxiii. Beibl. 57, p. 35.
Chiengmai, Doi Sootep, 300–720 m., *Kerr*, 718, 718a.
Distr. Tonkin.

Lao name, Mai Looey Döo.

The leaves of Kerr's specimens are rather broader and less acuminate than the type specimens collected by Balansa, but the flowers appear to be identical.

Lagerstroemia Hossei, *Koehne*, Engl. Bot. Jahrb., xlii. Beibl. 97, p. 50.

Near Doi Sootep, *Hosseus* (ex *Koehne* l.c.).

Lagerstroemia Collettii, *Craib*, sp. n., affinis *L. quinquevalvi*, Koehne, a qua calycis fructiferis tubo obconico haud patelliformi differt.

Arbor circiter 9 m. alta (*ex Kerr*). *Ramuli* ad 9 mm. diametro, minute puberuli. *Folia* ovato-lanceolata vel anguste elliptica, apice obtusa basi acuminata, 8–14 cm. longa, 3–5 cm. lata, margine integro, rigide chartacea, supra glabra, punctata, subtus pallidiora, nervis minute velutina, nervis lateralibus utrinque circiter 9 supra conspicuis subtus prominulis; petioli 5 mm. longi, velutini. *Paniculae* terminales, 20–40 cm. longae, 12–24 cm. latae, foliis interruptae, ramis dense minute velutinis. *Alabastra* apice rotundata, apiculo brevi coronata. *Calyx* extus dense cinereo-pulverulentus; tubus 6 mm. longus; lobi 7, deltoidei, acuti, 3 mm. longi, intus vix glabri; jugi in lacinias anguste lanceolatas acutas 3–4 mm. longas producti. *Petala* oblongo-obovata, 8 mm. longa, 5 mm. lata, in unguem 1 mm. longum contracta. *Stamina* ∞, filamentis usque ad 1·7 cm. longis. *Ovarium* globosum, glabrum; stylus glaber, 1·7 cm. longus. *Calyx* fructifer obconicus, lobis deciduis. *Fructus* ellipsoideus vel fere globosus, 1 cm. saltem diametiens. *L. sp.* aff. *L. piriformi*, Koehne—Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 60.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1264.

Distr. Burma, *Collett*, 857, *Lace*, 4192.

L. quinquevalvis is a very imperfectly known species in fruit only. *L. Collettii* is distinguished from it by the shape of its fruiting calyx and by its lobes being not glabrous on the inner surface.

Lagerstroemia intermedia, *Koehne*, var. **oblonga**, *Craib*, var. nov., a typa foliis oblongis apice truncatis vel rotundatis breviter acuminatis, nervis nervulisque supra prominulis, reticulatione haud tam tenui, alabastris floribusque paulo majoribus recedit.—*L. oblonga*, Craib MSS.

Chiengmai, in eng jungle, 300 m., *Kerr*, 578.

Lagerstroemia Loudoni, *Teysm. et Binn.*—For. Fl. Burma, i. p. 523.

Siam, *Teysmann*; Paknampo, *Witt*, 14.

Lagerstroemia macrocarpa, *Wall.*—For. Fl. Burma, i. p. 524; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 59. *L. speciosa*, Koehne, Engl. Pflanzenr., iv. 216, p. 261, p.p.

Korat, 90 m., *Witt*, 34.

Dist. Burma.

Vern. Mai Intanin (ex *Witt*).

Lagerstroemia tomentosa, *Presl.*—F.B.I., ii. p. 578, *excl. var.*; For. Fl. Burma, i. p. 522; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 60.

Raheng, *Witt*, 19, 20.

var. **caudata**, *Koehne*, Engl. Bot. Jahrb., xlii. Beibl. 97, p. 51.
Chiengmai, Doi Sootep, 1000 m., *Hosseus*, 512; Muang Fang, 1000–1600 m., *Hosseus*, 600.
Distr. Burma (type).

Lagerstroemia turbinata, *Koehne*, Engl. Bot. Jahrb., iv. p. 34. *L. floribunda*, Jack—F.B.I., ii. p. 577, p.p.; For. Fl. Burma, i. p. 522, p.p.; Williams, Bull. Herb. Boiss., iv. (1904) p. 1031.
Menan, *Hosseus*, 4; Anhin, *Schomburgk*, 240.
Distr. China, Burma, Cochinchina, Malay Peninsula.

Lagerstroemia undulata, *Koehne*, Engl. Bot. Jahrb., xlii. Beibl. 97, p. 52.
Meh Ping Rapids, 200 m., *Hosseus*, 530.

Lagerstroemia villosa, *Wall.*—For. Fl. Burma, i. p. 524; F.B.I., ii. p. 578; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 59.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 1150; Muang Fang, 100 m., *Hosseus*, 616.
Distr. Burma.

Duabanga sonneratioides, *Ham.*—F.B.I., ii. p. 579; For. Fl. Burma, i. p. 525.
Muang Prow, Meh Kaut, 450 m., *Kerr*, 1032.
Distr. India, Burma, Assam, Yunnan, Tonkin.
Lao name, Tohng Teng.

Onagraceae.

Jussiaea suffruticosa, *Linn.*—F.B.I., ii. p. 587; Williams, Bull. Herb. Boiss., iv. (1904) p. 1033.
Chiengmai, edge of paddy fields, 300 m., *Kerr*, 802.
Distr. Tropics.

Ludwigia prostrata, *Roxb.*—F.B.I., ii. p. 588.
Chiengmai, edge of paddy fields, 300 m., *Kerr*, 804.
Distr. Tropical Asia and Africa.

Samydaceae.

Casearia flexuosa, *Craib*, sp. n., affinis *C. Lobbianae*, Turcz., a qua foliis serratis basi attenuatis, stipulis persistentibus, stylo longiore haud glabro, fructu ellipsoideo recedit.

Fruticulus 1·2 m. altus, ramis albescentibus puberulis, ramulis angulatis mox teretibus 1·5–2 mm. diametro flexuosis dense puberulis. *Folia* oblanceolata vel oblongo-lanceolata, apice acuminata, mucronata, basi attenuata, 3·5–13 cm. longa, 1·2–3·5 cm. lata, membranacea vel subchartacea, sparse puberula, margine serrato leviter recurvo, nervis lateralibus utrinque circiter 5 cum nervulis utrinque conspicuis; petioli usque ad 7 mm. longi; stipulae persistentes, rigidae, 2 mm. longae, 0·5 mm. latae. *Glomeruli* axillares; pedicelli breves glabri. *Sepala* 5, basi breviter connata, subaequalia, 3 mm. longa, fere 2 mm. lata, apice obtusa, fere glabra, margine ciliato. *Stamina* 10, staminodia 10 paulo superantia; filamenta staminodiis villosis basi adnata, villosa. *Pistillum* 1·5 mm. altum; ovarium stylo subaequilongum, glabrum, stylo inferne pubescente. *Fructus* pedicello 3 mm. longo, ellipsoideus, glaber, circiter 1 cm. altus, 8 mm. diametro; semina albida, nitentia, 6 mm. longa.

Chiengmai, in an overgrown old clearing on Doi Sootep, 720 m., *Kerr*, 694.

Casearia Kerrii, *Craib*, sp. n., a *C. tomentosa*, Roxb., cui affinis, foliis multo majoribus apice rotundatis vel obtusis interdum emarginatis, staminibus longioribus, antheris duplo majoribus, ovario superne villoso, fructu multo majore recedit.

Arbor, ramulis teretibus, juventute dense velutino-tomentosis, cortice rubro-brunneo striato parce lenticelloso obtectis. *Folia* obovata, obovato-elliptica vel oblonga, apice rotundata vel obtusa, interdum emarginata, basi inaequalia juventute attenuata mox rotundata vel truncata, 8–16·5 cm. longa, 4–8·5 cm. lata, subcoriacea, supra minute puberula nisi costa tomentosa, subtus costa nervisque primariis tomentosa, margine sub anthesin subintegro, fructu distincte crenato-serrato, nervis lateralibus utrinque 9–11 subtus prominentibus, supra cum nervulis prominulis; petioli ad 1 cm. longi. *Glomeruli* axillares, pluriflori; pedicelli 3–5 mm. longi, tomentelli. *Sepala* 5, basi breviter connata, subaequalia, 3–4 mm. longa, 2·5–3 mm. lata, apice obtusa, extus tomentella, margine membranaceo ciliato. *Filamenta* 2·5 mm. longa, glabra nisi basi intus puberula, staminodiis 1·5 mm. longis basi brevissime adnata. *Ovarium* 1 mm. altum, superne villosum; stylus 2 mm. longus, inferne ut in ovario villosus, stigmate capitato. *Fructus* ellipsoideus, 4 cm. longus, ± 2 cm. diametro, glaber, pedicello crasso 8 mm. longo.

Chiengmai, in deciduous eng jungle, 300 m., *Kerr*, 580.
Lao name, Ki Seua Quang.

Homalium minutiflorum, *Kurz*, For. Fl. Burma, i. p. 532, *ex descr.*
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1138.
Distr. Burma (ex *Kurz*, l.c.).
This species is not represented in Herb. Kew.

Passifloraceae.

Passiflora lunata, *Willd.*
Bangkok, *Zimmermann*, 53.
Native of Trop. America.

Passiflora siamica, *Craib*, sp. n., affinis *P. hainanensi*, Hance, sed caulibus haud glabris valde diversa.

Herba scandens; ramuli ad 2·5 mm. diametro, pubescentes, striati. *Folia* lanceolata vel ovato-lanceolata, apice acutiuscula, mucronata, basi rotundata, 5·2–14·5 cm. longa, 1·5–5·5 cm. lata, supra pilis basi incrassatis fere hispida, subtus, nervis praecipue, molliter pubescentia et praeterea matura glandis 10–14 in lineas duas costa parallelas et ab ea circiter 1 cm. utrinque distantes dispositis, chartacea, margine integro, nervis lateralibus utrinque circiter 5 intra marginem arcuatis cum nervis transversis supra conspicuis subtus prominulis. *Petioli* ad 1·5 cm. longi ut in rachi pubescentes, basin versus glandis duobus sessilibus instructi. *Cirrhi* plus minusve 15 cm. longi, unilateraliter pilosi, cum inflorescentia axillari orti. *Bracteae* lineares, acutae, ad 1·5 cm. longae 2·5 mm. latae, puberulae. *Sepala* 5, basi breviter connata, oblonga, obtusa, 1·5 cm. longa, 6 mm. lata, extus puberula. *Petala* 5, alba, sepalis conformia sed paulo minora et glabra. *Corona* duplex, exterior fimbriata, ad 8 mm. alta, interior dentata, plicata quam exteriore dimidio brevior. *Filamenta* 16 mm. longa,

ad medium connata, ovarium includentia, glabra ; antherae 4 mm. longae. *Ovarium* 2·5 mm. altum, hirsutum, gynophorio circiter 4 mm. longo filamentis adnato ; styli 4–5 liberi, filamentis subaequales, cum petalis filamentisque sicco sparse brunneo-picti. *Fructus* globosus, 1·5–2 cm. diametro ; semina 5 mm. longa, nigra, foveolata.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1049a ; Chieng Dao, 450–840 m., *Kerr*, 1049, 1256.

Modecca pinnatisecta, *Craib*, sp. n., a *M. apiculata*, Masters, cui affinis foliis pinnatim 5-sectis, glandis subtus aliter dispositis, antherarum cauda longiore, praecipue differt.

Herba scandens, omnino glabra. *Ramuli* cinereo-albi, sulcati, ad 1 mm. diametro. *Folia* 11–19 cm. longa, 14–24 cm. lata, pinnatim 5-secta, segmentis lanceolatis vel anguste lanceolatis, apice acutis breviter mucronatis 9–15 cm. longis 1–2 cm. latis, membranacea, margine integro, nervis lateralibus utrinque 2, nervulis plerumque patulis intra marginem distincte arcuatis, omnibus utrinque conspicuis, pagina superiore basi glandis 2 instructa, subtus glandulis 4 sinus adversus medio intra marginem et rachem ornata ; petioli 2·3–4·5 cm. longi. *Pedunculi* axillares, 6–10 cm. longi, in viticulas producti ; pedicelli graciles, ad 1 cm. longi. ♂ : *Calycis* tubus plus minusve 3 mm. longus, lobi 5, lanceolati, apice acutiusculi, 1·1 cm. longi, 2 mm. lati, 7–9-nervati ; loborum basi iisque oppositae glandae oblongae, majusculae, carnosae, apice recurvae. *Petala* 5, oblanceolata, 8·5 mm. longa, 2 mm. lata, margine fimbriato, 3-nervata. *Stamina* libera, petalis isomera ; filamenta basi leviter dilatata, 2·5 mm. longa ; antherae 3 mm. longae, cauda 3·5 mm. longa. *Ovarii* rudimentum 1 mm. altum. ♀ : *Calycis* tubus, lobi, et glandae maris sed paulo minores. *Petala* maris, nisi tantum 2·5 mm. longa, 0·5 mm. lata. *Staminodia* parva. *Ovarium* gynophorio 2 mm. longo suffultum, 4 mm. altum, 1·5 mm. diametro ; stylus circiter 1 mm. longus, ramis 3 bifidis. *Fructus* gynophorio 7 mm. longo, 5 cm. longus, exocarpio tenui rubro-brunneo.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 751.
Distr. Burma, v.s. in Hb. Lace.

Carica Papaya, *Linn.*—F.B.I., ii. p. 599.
Bangkok, *Zimmermann*, 134.
Cultivated throughout India.

Cucurbitaceae.

Trichosanthes cucumerina, *Linn.*—F.B.I., ii. p. 609.
Chiengmai, a common weed, 300 m., *Kerr*, 714.
Distr. India, Malaya, N. Australia.

Trichosanthes multiloba, *Miq.*—F.B.I., ii. p. 607.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 653.
Distr. Sikkim, Khasia, Burma.

Trichosanthes palmata, *Roxb.*—F.B.I., ii. p. 606 ; Coll. et Hemsl , Journ. Linn. Soc., xxviii. p. 61.
Chiengmai, 300 m., *Kerr*, 1266.
Distr. India, Burma, Malaya, Australia.

Momordica macrophylla, *Gaye*, Rec. Bot. Surv. Ind., iii. p. 61.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1263.

Distr. Burma.

Kerr's plant (♂) agrees with Lace's 3287 (♀) from Maymyo which was named *M. macrophylla* in Herb. Calc.

Thladiantha Hookeri, *C. B. Clarke*, F.B.I., ii. p. 631.

Chiengmai, in evergreen jungle on Doi Sootep, 720 m., *Kerr*, 662.

Distr. Assam.

Zehneria umbellata, *Thwaites*—F.B.I., ii. p. 625 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 61.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 1130, 1130a.

Distr. Afghanistan, India, Burma, Assam, Tonkin, Java.

Begoniaceae.

Begonia incerta, *Craib*, sp. n., ex affinitate *B. Kerrii*, Craib, sed floribus majoribus, ovario capsulaque haud glabris differt.

Herba subacaulis, 4–9 cm. alta. *Folia* solitaria vel gemina, orbicularia, apice obtusa, basi cordata, ad 2·5 cm. diametro, membranacea, utrinque brevissime, subtus parcius, pilosa, margine subintegro ; petioli 1–1·5 cm. longi, supra canaliculati, ut in foliis pilosi. *Pedunculi* simplices, ad 6·5 cm. longi, breviter pilosi. ♂: *Sepala* 2, alba, rotundata, 7·5 mm. longa, 7 mm. lata, extus parce minute pilosa, margine ciliolato. *Petala* 2, alba, lineari-oblonga, 5 mm. longa, 1·5 mm. lata, glabra. *Filamenta* 2 mm. longa, ad medium connata, antheris parvis oblongis, connectivo haud producto. ♀: *Perianthii* segmenta 5, alba, inaequalia, usque ad 5 mm. longa et 4 mm. lata. *Styli* 3, e basi liberi, stigmatorum ramulis 2. *Capsula* vix matura, brevissime pilosa, 8 mm. alta, 6 mm. lata, loculis 3 (?).

Meh Ping Rapids, banks of river on limestone 180 m., *Kerr*, 508.

Begonia integrifolia, *Dalz.*—F.B.I., ii. p. 648.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 730.

Distr. Western Ghauts, Burma.

Begonia Kerrii, *Craib*, sp. n., affinis *B. parviflorae*, DC. a qua capsulae ala maxima breviore apice rotundata haud attenuata differt.

Herba acaulis, unifoliata, 4–11 cm. alta. *Folia* suborbicularia vel elliptica, apice obtusa, basi cordata, 3-7 cm. longa, 2·7–6 cm. lata, utrinque, nervis subtus densius, brevissime parcissimeque pilosa, membranacea, margine irregulariter dentata, dentibus minute denticulatis, ciliata, nervis e basi 7 utrinque conspicuis ; petioli 1·5–5·5 cm. longa, breviter pilosi. *Pedunculus* solitarius, gracilis, ad 7·5 cm. longus, saepissime simplex, interdum fere e basi furcatus, vix glaber. ♂: *Sepala* 2, subrotundata, 7 mm. longa, 6 mm. lata, extus parce pilosa. *Petala* 2, oblanceolata, 7 mm. longa, circiter 2 mm. lata. *Filamenta* paulo ultra medium connata ; antherae obovatae, connectivo haud producto. ♀: *Perianthii* segmenta inaequalia, ad 6 mm. longa, 5 mm. lata. *Styli* 3, e basi liberi, apice brevissime bifidi. *Capsula* glabra, alis membranaceis valde inaequalibus, nervis horizontalibus, 7 mm. alta, fere 1 cm. lata, 3-locularis, placentis bifidis.

Ban Kan, on damp limestone, *Kerr*, 508a.

Begonia Roxburghii, *DC.*—F.B.I., ii. p. 635.
Chiengmai, Doi Sootep, 1200 m., *Kerr*, 888.
Distr. Himalaya, Burma, Assam.

Begonia sootepensis, *Craib*, sp. n., habitu *B. yunnanensi*, Levl., similis sed altior, caule vix glabro, foliis crassioribus supra setulosis.

Herba erecta, ad 43 cm. alta; caulis ruber, rigidiusculus, teres, sulcatus, ad 5 mm. diametro, glabrescens, nodis basi praecipue incrassatis. *Folia* oblique lanceolata, apice attenuata, basi valde oblique cordata, 3·5–7 cm. longa, 1·5–3 cm. lata, membranacea vel subchartacea, supra breviter setulosa, subtus glabra nisi nervis pilis brevibus parce instructis, margine serrato vel dentato, e basi 3–5-nervia, nervis cum nervulis supra subobscuris subtus prominulis; petioli ad 6·5 cm. longi, glabri; stipulae subdeciduae, oblique lanceolatae, apice attenuatae, circiter 1 cm. longae, 3 mm. latae, margine fimbriato, nervis conspicuis. *Racemi* vel solitarii terminales tantum vel ramulos breves axillares quoque terminantes; pedicelli ad 7 mm. longi, graciles, medio bracteolis duobus parvis deciduis scariosis ornati. ♂: *Sepala* 2, late elliptica vel subrotundata, apice obtusa, ad 5·5 mm. longa 4 mm. lata. *Petala* 2, late lanceolata, 2·5 mm. longa, 1 mm. lata. *Filamenta* brevia, basi connata, connectivo in appendicem triangularem membranaceam producto. ♀: *Perianthii* segmenta 5, exteriora late elliptica vel subrotundata, ad 6 mm. longa, 4·5 mm. lata, interiora late lanceolata, 5 mm. longa, 2 mm. lata, omnia mucronata. *Styli* 3, breviter connati, stigmatibus 3 lunatis. *Capsula* ut visa immatura, 9 mm. alta 11 mm. lata, alis chartaceis valde inaequalibus, loculis 3, placentis bifidis.

Chiengmai, in crevices on damp rocks on Doi Sootep, 1350 m., *Kerr*, 785.

Begonia, sp. n.?
Chiengmai, Doi Sootep, 660–900 m., *Kerr*, 557.
Represented by male flowers only. It is closely allied to some of the Yunnan *Begonias* collected by Henry. Dr. Kerr remarks that the stem is edible and tastes like rhubarb.

Umbelliferae.

Hydrocotyle javanica, *Thunb.*—F.B.I., ii. p. 667; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 61.
Chiengmai, Doi Sootep, 900 m., *Kerr*, 1258.
Distr. Tropics.

Hydrocotyle siamica, *Craib*, sp. n., ab affini *H. Hookeri* (C. B. Clarke, pro var.), pedicellis multo longioribus facile distinguenda.

Herba repens, ad nodos interdum radicans. *Folia* pentagona, vix vel fere ad medium lobata, ad 9 cm. longa et 10 cm. lata, utrinque parcissime setulosa et praeterea nervis subtus puberula, e basi 7–9-nervia, nervis supra conspicuis subtus prominulis; petioli ad 15 cm. longi. *Umbellae* axillares, solitariae, pedunculo ad 10·5 cm. longo brunneo-puberulo suffultae. *Pedicelli* ad 8 mm. longi, glabri vel pilis perpaucis rigidiusculis deciduis instructi, basi conspicue bracteati. *Calycis* dentes deficientes. *Petala* subviridia, oblonga,

apice acuta incurva, 1 mm. longa, vix ·5 mm. lata, glabra. *Antherae* oblongae, filamentis circiter 1 mm. longis dorso affixae. *Styli* persistentes, ad 1·5 mm. longi. *Fructus* a latere compressus, 1·5 mm. altus, 2 mm. latus, jugis exceptis pilis albis brevibus obtusis rigidis instructus.

Chiengmai, Doi Sootep, 1200–1650 m., *Kerr*, 670, *Hosseus*, 192.

For uniformity with the Flora of British India the Siam plant might have been treated as a variety of *H. javanica* but in the writer's opinion the variety *Hookeri*, C. B. Clarke, of *H. javanica* should be raised to specific rank as should also the variety *chinensis*, Dunn, of the same species. These three species *H. chinensis*, *H. Hookeri*, and *H. siamica*, form a very natural group distinguished from *H. javanica* by their solitary generally long peduncled umbels.

Eryngium foetidum, *Linn.*

Chiengmai, Doi Sootep, 720 m., *Kerr*, 738.

Distr. Burma, Assam, Trop. Africa and America.

Dr. Kerr remarks that the leaves, which are strongly aromatic, are eaten with curries.

Seseli siamicum, *Craib*, sp. n., ex affinitate *S. yunnanensis*, Franch., sed foliis sine articulis, radiis paulo longioribus, involucelli bracteis liberis, pedicellis longioribus, calycis dentibus minutis differt.

Herba erecta, 5 dm.–1 m. alta, glaberrima ; radix fusiformis, apice foliorum vestigiis vestita ; caules solitarii vel gemini, superne ramosi, ad 3 mm. diametro, rigidi, striati. *Folia* basilaria et inferiora 6–11 cm. longa, 8–15 cm. lata, decomposita, segmentis ultimis linearibus ad 4 cm. longis 1·5 mm. latis, petiolis ad 15 cm. longis caules amplectantibus, media et superiora bipinnata, trifoliolata tantum, vel ad vaginas reducta. *Pedunculi* ad 10·5 cm. longi. *Involucrum* nullum vel monophyllum ad 1 cm. longum, margine membranaceo ; radii 4–8 subaequales, 3–4·3 cm. longi. *Involucelli* bracteae lanceolatae, quam pedicellis dimidio breviores, liberae. *Pedicelli* ad 7 mm. longi. *Calycis* dentes minuti. *Petala* alba, acumine inflexo. *Styli* perbreves. *Fructus* ovoideus, 3 mm. longus, 1·5 mm. diametro.

Chiengmai, Eng jungle on Doi Sootep, 300–750 m., *Kerr*, 774.

Araliaceae.

Heptapleurum venulosum, *Seem.*, var. **macrophylla**, *C. B. Clarke*, F.B.I., ii. p. 729. *H. venulosum*, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 62.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 555.

Distr. (of var.). Burma.

Lao name, Mai Gin Pet.

Brassaiopsis speciosa, *Dcne. et Planch.*—F.B.I., ii. p. 737.

Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1170.

Distr. Himalaya, Assam, Yunnan, Java.

Alangiaceae.

Alangium begoniifolium, *Wang.* *Marlea begoniaefolia*, Roxb.—F.B.I., ii. p. 743 ; For. Fl. Burma, i. p. 544 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 62.

Chiengmai, Doi Sootep, 900 m., *Kerr*, 1121.
Distr. India, China, Japan, Malaya.

Alangium Kurzii, *Craib*, nom. nov. *Marlea tomentosa*, Kurz, For. Fl. Burma, i. p. 545, *non* Endl.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1172.
Distr. Burma (in Herb. Calc.).
Wangerin, in his monograph of the *Alangiaceae* in Engler's Pflanzenreich, quotes Kurz, For. Fl. Burma, for the true *Marlea tomentosa*, Endl. The description given by Kurz does not, however, agree with the Java specimens, *e.g.*, in the size of the flower and in the indumentum of the under surface of the leaf. On the other hand, Kurz's description applies very well to the plant quoted above, which is, in the writer's opinion, the *M. tomentosa*, Kurz *non* Endl. It may be noted that no Burmese specimen is quoted as having been seen by Wangerin.

Alangium salviifolium, *Wang.*, sub-sp. **hexapetalum**, *Wang.* *A. Lamarckii*, Thwaites—F.B.I., ii. p. 741.
Ban Meh Chang, 300 m., *Kerr*, 979; Chiengmai, 300 m., *Hosseus*, 440.
Distr. India, Andamans, Malaya, Philippines, Comoro Is.
Lao name, Mai Poo (ex *Kerr*).

II.—A PINE DISEASE.

(*Diplodia pinea*, Kickx.)

K. Bancroft.

A disease affecting various species of *Pinus* was reported from widely separated districts in England during the years 1903 to 1906. In March, 1906, Massee investigated the disease and showed by infection experiments that it was caused by the fungus *Diplodia pinea*. The fungus has also been recorded in France, Belgium and Italy.

During the early part of 1910 a consignment of diseased shoots of *Pinus insignis* and *Pinus montana* was received from the eastern forests of Cape Colony. An examination showed that in every case the disease was caused by the above-mentioned fungus. The consignment furnished material for an investigation, under Mr. Massee's direction, of the mode of entrance of the fungus and of its range of hosts.

The disease is confined to the terminal portion of the shoots, and can be recognised by the yellowing and subsequent shedding of the leaves, and the death of the terminal portion of the shoots. The exact length of that part of the shoot which succumbs depends on the distance of the point of infection from the apex of the shoot; most usually the terminal ten or eighteen inches die. The dead shoots remain attached and furnish successive crops of spores of the fungus. The spores are produced in small, black perithecia which are found in abundance on the affected shoots and are visible to the naked eye as minute black dots; they can usually be observed on the affected leaves, though here they occur less frequently than on

the shoots. The spores are evidently wind-borne and are thus transferred from diseased to healthy parts of the shoots.

The hyphae of the fungus occur in abundance in the infected shoots and leaves ; they are colourless when young and become darker in colour as they grow older, the old hyphae being of a dark-brown colour ; they are septate at frequent intervals and measure on the average 5–6 μ in width. The hyphae are most frequently met with in the cortex and phloem, but sometimes they extend into the wood along the medullary rays. The tissues which are more especially affected are those which serve as channels for the conduction of elaborated food material. The resultant effect of an attack of the disease is the diminution of the food material available for the growth of the plant.

In the experiments which were conducted at Kew for the purpose of determining the mode of entrance of the fungus into the tissues and its variety of hosts the following species were employed :—

Pinus sylvestris, *P. Strobus*, *P. insignis*, *P. Pinaster*, *P. montana*, *Picea excelsa*, *Abies pectinata*, and *Larix europaea*. The plants were three years old, and in each case three plants were infected and one kept as a control.

Various attempts were made to infect the leaves and the younger and the older parts of the shoots by transferring the spores of the fungus to the unbroken surface in a drop of distilled water. The plants were kept in a greenhouse at a temperature of 75° F., and five attempts were made on each plant. The capacity for germination of the spores was previously tested by mounting them in water in a hanging-drop and germination was found to be active, taking place within 24 hours. All attempts to infect at an unbroken surface failed.

By similar experiments it was found that infection could occur readily at a wound ; it was demonstrated that only a small wound, such as a puncture, was sufficient, the spores being transferred to a drop of water on the puncture. Positive results were obtained only with the species of *Pinus* ; repeated attempts failed to produce any infection of the species of *Picea*, *Abies* and *Larix*.

The species of *Pinus* showed a yellowing of the leaves within seven weeks of the time of infecting ; this yellowing was followed by the death of the shoot and the shedding of the leaves. The mycelium was found to travel not more than 3 inches below the point of infection. The distance, therefore, to which an infected shoot dies depends on the position of the point of infection. The mycelium of the fungus could be traced in the affected shoots with some degree of facility at the end of seven weeks after the time of infection. Four months after infection no perithecia had been produced on the dead parts.

The results of the experiments were in accordance with those which were obtained by Massee and which were published in the Journal of the Board of Agriculture, vol. xiv., June, 1907, p. 165. With regard to the time of production of the perithecia, Massee concluded that the perithecia were not produced until the year following that of infection. My results showed that no perithecia were produced four months after infection.

The two conclusions which are of primary importance in connexion with the fungus are (1) that species of *Picea*, *Abies* and *Larix* appear to be immune to the disease, and (2) that it is only possible to infect species of *Pinus* at a broken or wounded surface.

The disease has been most commonly met with in the nursery, and it is here that measures should be taken to stop its spread. The removal and destruction of diseased parts should be carefully attended to. In the forest direct methods of treatment are scarcely practicable. In districts where the disease is known to occur it is advisable to avoid cultivating large areas with species of *Pinus*; the disease would be more easily kept under control by practising a mixed cultivation. It should be borne in mind that a close aggregation of large numbers of plants of the same kind favours the development and spread of an epidemic.

In connexion with the mode of entrance of the fungus Massee has mentioned in his publications, and I have also observed, that on the samples of diseased material received at Kew infection could be traced to small wounds on the bark. Such wounds are probably made by insects, and it is important that this point should be investigated. If these wounds can be traced to one or two species of insect in a district, it might be advisable that an attempt should be made to exterminate the insects.

In the above it has been only possible to indicate certain lines of investigation of the disease and of its method of treatment; further work has had to be postponed until some future period.

The fungus was originally described from France, and has since been recorded from Belgium, Italy and Finland, on dead needles of *Pinus sylvestris* and *Pinus montana*. Other species of *Diplodia* which occur on pines and are closely related to *Diplodia pinea* are *D. acicola*, Sacc., *D. conigena*, Desm., *D. sapinea*, Fries, the difference between these species being in the relative sizes of the spores. The following is a diagnosis of *Diplodia pinea*:—

Perithecia globose, erumpent; spores oblong, 35–40 × 16–18 μ, stalked, at first continuous and yellowish, becoming later one-septate and fuliginous, not constricted at the septum.

Kickx.—Fl. Flandr. I, p. 397.
Massee.—Diseases of cultivated Plants and Trees, 1910, p. 574.

III.—SOME ADDITIONS TO THE LEGUMINOUS GENUS FORDIA.

S. T. Dunn.

Mr. Charles Ford while Superintendent of the Botanical Department at Hong Kong discovered on the banks of the West River in the Chinese Province of Kwangtung a remarkable Leguminous tree with crowded racemes of pink flowers growing upon the bare stem beneath a spreading canopy of large multifoliolate leaves. Specimens sent by him to Kew were subsequently described by Hemsley as the type of a new genus to which the name *Fordia* was given in his honour and the species was described under the name of *F. cauliflora*. As Hemsley pointed out, the tree

differed from all allied species then known in its multifoliolate (8–12-paired) leaves, rigid racemes of flowers borne on the old wood, 2-ovulate ovary and strophiolate seeds. It is true that in spite of these characters it might well have found a place within the heterogeneous collection of groups which, even at that time, constituted the genus *Millettia*, but its author judged, no doubt, that it was more for the convenience of botanists to found upon it a new genus than to add a fresh type to that already perplexing collection.

The object of this paper is to associate with *Fordia* several species of small trees inhabiting the Malayan islands which show a very complete agreement with the Chinese species in the structure of their inflorescence, flowers and fruit. The leaf characters of the genus, as thus extended, form a gradual transition towards those of *Millettia sericea* and allied species, while the occasional axillary position of the racemes in one of the species makes it a connecting link with the group of that genus to which *M. piscidia* belongs; but these tendencies towards other types, while elucidating the systematic position of *Fordia*, are not sufficient to invalidate its individual status. A particularly constant feature appears to be the development of the 2-ovuled gynœcium into an oblanceolate pod with two seeds, enclosed between early-dehiscent coriaceous valves.

The five species of *Fordia*, including those now proposed, inhabit S. E. China, Borneo and Sumatra, that is to say, the northern and southern shores of the S. China Sea and if, as is likely, further research reveals these or additional species in the Philippine Islands and Indo-China, it will be one more genus which, like *Illigera*, entirely surrounds this almost isolated basin.

Clavis Specierum.

Foliola stipellata ... ... 1. *F. cauliflora.*
Stipellae nullae
  Foliola coriacea ... ... 2. *F. coriacea.*
  Foliola papyracea
    Flores subsessiles
      Foliola glabra, terminale 15 cm. longum ... ... 3. *F. stipularis.*
      Foliola subtus subsericea, terminale 25 cm. longum ... 4. *F. Gibbsiae.*
    Flores graciliter pedicellati ... ... 5. *F. filipes.*

1. **F. cauliflora,** *Hemsl.* Enum. Pl. China, i. (1886) 160, t. 4.
China. Kwangtung: West River, *Ford.*
The trees in the Botanic Garden at Hong Kong are now some 12 feet high and have spread by throwing up shoots from the ground over a considerable area round their original position; they bear every year upon their bare stems, now some inches thick, an abundance of pink-flowered racemes.

2. **F. coriacea,** *Dunn*, sp. n. *Arbor* parva; ramulis glabris griseis lenticellatis. *Folia* 5–8-juga, 40–60 cm. longa, rachide glabra exstipulata; foliola anguste lanceolata, apice gradatim acuminata, basi acuta, 12–15 cm. longa, rigide coriacea, supra glabra, subtus pilis adpressis sericeis nitentia tarde glabra, costa utrinque

prominula, venis secundariis ascendentibus marginem propinquantibus 8-paribus exstipellatis. *Racemi* in caulibus veteribus fasciculati, ad 15 cm. longi, ebracteati, breviter pedunculati. *Flores* in nodis nonnunquam ad 4 mm. productis fasciculati, 1 cm. longi, subsessiles. *Calyx* breviter campanulatus, tandem latior, 2 mm. longus, obscure lobatus, puberulus. *Vexilli* lamina rotundata, basi maculis duabus notata, extus sericea ; alae carinaque aequilongae. *Stamina* diadelpha? *Ovarium* 2-ovulatum.

Millettia coriacea, Dunn, MS.

Borneo. Kuching, *Haviland*, 2902, *Hewitt*, March, 1893 ; Sarawak : Baram District, *Hose*, 75 : Selabat, *Haviland*.

3. **F. stipularis**, *Dunn*, nom. nov. *Millettia stipularis*, Prain in Journ. As. Soc. Beng. xlvi. ii. (1897) 363.

Sumatra. *Forbes*, 2948.

4. **F. Gibbsiae**, *Dunn* and *Baker f.*, ined.

Haviland and *Hose*, 3280, *Hose*, 334 and *Barber*, 36, all from the island of Borneo, agree with specimens collected by Miss Gibbs in that island and are named in her honour. They will be described by Mr. E. G. Baker and myself in the paper which will shortly be published upon the subject of her collections.

5. **F. filipes**, *Dunn*, sp. nov. *Arbor* parva? inflorescentiis exceptis glabra ; ramulis griseis lenticellatis. *Folia* 4-juga, 20–30 cm. longa, exstipulata ; foliola lanceolata, acuminata, caudata, basi acuta, 8–15 cm. longa, chartacea, venis marginem propinquantibus utrinque 8, stipellis 0. *Racemi* axillares et laterales, fasciculati, fere ad basin nodosi, rachide puberula. *Flores* in nodis 1–4-ni, 1 cm. longi, pedicellis gracilibus, 3–5 mm. longis, puberulis. *Calyx* breviter campanulatus, tandem crateriformis, 2–3 mm. longus, tenuissime sericeus, lobis obscuris, basi bracteolis duabus minutis suffultus. *Vexilli* lamina rotundata, cordata, basi bimaculata, dorso sericea, rubella. *Alae* carinaque aequilongae. *Stamina* diadelphia, vexillare medio paullo connatum. *Ovarium* sericeum, 2-ovulatum.

Millettia filipes, Dunn, MS.

Borneo. Kuching, *Haviland*, 2893, 2903.

IV.—MISCELLANEOUS NOTES.

Mr. F. M. Bailey.—We note with pleasure, in the list of New Year Day Honours, that Mr. F. M. Bailey, Colonial Botanist, Brisbane, Queensland, has been appointed a Companion of the Most Distinguished Order of Saint Michael and Saint George.

Mr. F. C. McClellan.—We are informed that Mr. F. C. McClellan has been appointed Director of Agriculture, Zanzibar, in succession to Mr. R. N. Lyne, who, we learn, has been appointed Director of Agriculture, Mozambique.

MR. M. T. DAWE.—We are informed that MR. M. T. DAWE lately Officer-in-Charge and Superintendent of Forests in the Botanical, Forestry and Scientific Department, Uganda, has been appointed Director of Agriculture under the Mozambique Company.

MR. HARRY THOMAS, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

Visitors during 1910.—3,546,302 visitors to the Royal Botanic Gardens have been recorded during the year 1910. These figures show an increase of 186,081 over those of the previous year and are the largest numbers on record. During the ten years 1900–1909, 20,023,749 persons have visited the gardens giving an average of 2,002,374. The total number of visitors on Sundays during 1910 was 1,614,085 and on weekdays 1,932,217.

Sunday visitors have increased by the large amount of 229,716 while the number of visitors on weekdays show a decrease of 43,635 from the figures of the previous year in spite of the fact that there were five Bank Holidays when as many as 424,010 persons visited the gardens as against 242,372 persons on the four Bank Holidays in 1909.

The greatest attendance on any one day was 152,454 on Whit-Monday, May 16th, being nearly 40,000 more than any figures previously recorded for a single day. The smallest number on any one day was 290 on November 3rd. The largest Sunday attendance was 91,058 on May 15th and the smallest 251. The former figures are about 20,000 in excess of those recorded for last year.

The detailed monthly returns are given below :—

January	65,212
February	77,528
March	507,192
April	343,437
May	679,734
June	364,521
July	383,646
August	562,420
September	270,978
October	191,844
November	37,717
December	62,073
	3,546,302

Additions to Gardens, 1910.—Additions to the collections of plants cultivated at the Royal Botanic Gardens, Kew, have been made during the year by exchanges with other gardens, private as well as

public, and by purchase from nurserymen and others. Contributions of plants and seeds received from botanic gardens include the following :—

Arnold Arboretum. A large number of trees and shrubs, and packets of seeds.

Calcutta. Wardian case of plants ; orchids and bulbs ; collections of seeds from the Himilaya.

Dunedin. Wardian case of plants ; seeds of New Zealand plants.

Jamaica. Two Wardian cases of ferns.

Java. Wardian case of plants.

Mauritius. Orchids.

Natal. Wardian case of Sansevierias, etc. ; seeds.

New York. Succulent and other plants.

Penang. Wardian case of plants.

Singapore. Two Wardian cases of plants ; box of orchids ; seeds of palms, etc.

Sydney. Wardian case of plants ; collection of seeds.

United States Department of Agriculture. Collection of Opuntias.

Exchanges were made with the Botanic Gardens of Edinburgh, Glasnevin, Cambridge and Oxford, and with most of the European gardens upon whom Kew is largely dependent for seeds of those annual herbaceous plants which fail to produce seeds at Kew.

H.M. the King of Italy presented a quantity of seeds of *Ginkgo biloba*. Captain A. A. Dorrien-Smith, D.S.O., gave plants and seeds obtained by him in Western Australia. Mr. P. W. Davis, Bedford Park, sent a quantity of New Zealand ferns. Mr. Derring, British Vice-Consul, Manaos, Brazil, sent seeds of *Leopoldinia Piassaba*. Dr. Drake-Brockman, Berbera, presented seeds of *Cordeauxia edulis* (Yeheb). Lady Hanbury, La Mortola, Ventimiglia, presented succulents, and other plants and seeds. Mr. J. T. Hibbert gave a collection of bulbs and seeds from Namaqualand. Lt.-Col. Sir G. Holford, Tetbury, and Mr. G. F. Moore, Chardwar, presented hybrid *Cypripediums*. Mr. R. Hoffman, Streatham, presented a collection of *Caladiums*. Sir Everard im Thurn, Governor of Fiji, and Mr. H. Tilly, Moulmein, sent orchids. The Earl of Jersey presented a large orange tree. Monsieur J. H. de Lehaie, Mons, sent bamboos. Sir E. Loder, Bart., Horsham, gave plants of *Rhododendron Loderii*. The Natural History Museum, South Kensington, presented South African seeds. Dr. Perez, Teneriffe, sent seeds of *Oreodaphne foetens*, *Senecio cruentus*, and of other interesting plants from the Canary Islands. Sir H. Roscoe, West Horsley, presented a large specimen of *Leucadendron argenteum*. Mr. R. Tower, H.M. Minister, Mexico, sent seeds of *Parthenium argentatum* (Guayule rubber plant), and of other economic plants. Messrs. Sander & Sons, St. Albans, and Messrs. S. Low & Co., Enfield, presented orchids.

Among the seeds and plants of interest distributed from Kew during the year were the following :—*Cordeauxia edulis* (Yeheb) (seeds), *Dolichandrone platycalyx* (seeds), *Ginkgo biloba* (seeds), *Metrosideros tomentosa* (seeds), *Parthenium argentatum* (seeds), *Phormium tenax*, var. (seeds), *Platycarya strobilacea* (seeds), *Senecio cruentus* (seeds), *Zizania aquatica* (seeds), and tubers of "Helianti."

A large consignment of trees and shrubs was sent to the Arnold Arboretum; cuttings of *Salix* to the Forestry Department, British East Africa; plants and seeds to Darjeeling Botanic Garden; collections of greenhouse plants to St. Andrews and Leeds Universities; a collection of economic plants to Eton College for the botanic garden; bamboos to Monsieur J. H. de Lehaie and Monsieur Maurice de Vilmorin, etc., etc. There was a large demand for seeds ripened at Kew and offered for distribution in *Bulletin*, *Appendix* I., 1910.

In connection with the opening of Cambridge Cottage as a museum of British Forestry, the garden of the cottage, which is enclosed by its original walls pierced by two wrought-iron gates, has become accessible to the public.

The largest consignment of new trees and shrubs received during the year was from the Arnold Arboretum. The Assistant Curator visited this establishment during the summer with the result that about 500 species and varieties were noted as desirable for the Kew collection. Almost all these were sent by Professor Sargent and arrived in perfect condition early in December. An experiment was made in bringing over fresh cuttings. The Assistant Curator returned on the "Campania" and, by the kindness of the Cunard officials, was allowed to place two baskets containing about 50 packets of cuttings in one of the cold storage rooms where the temperature during the voyage was kept at about 42° Fahr. Ten days elapsed between taking the cuttings from the plants in the Arnold Arboretum and placing them in the propagating frames at Kew, but although this was in mid-July, they arrived almost as fresh as when they were cut and only six sorts failed to strike root. Among the more interesting plants sent by Professor Sargent were a set of American Amelanchiers—a genus which badly needs revision; several new species of North American Æsculus, a set of dwarf American Crataegi, about 160 Chinese trees and shrubs introduced by Mr. E. H. Wilson, a set of American and Asiatic Willows, and such rare plants as *Leitneria floridanum*, *Larix Lyallii*, *Kalmia caroliniana* and *K. microphylla*, *Pinus pentaphylla*, *Pteroceltis Davidiana*, *Tripetaleia bracteata* and *Vaccinium membranaceum*. Of special interest was a new and undescribed species of *Hamamelis* from Missouri remarkable as flowering in spring like the Asiatic species; the only American species previously known, *H. virginica*, flowers in autumn.

Mr. Maurice L. de Vilmorin sent in March a most interesting consignment of new species raised by himself from Chinese seeds. The majority were unnamed, but amongst them were *Ailanthus sutchuenense*, and the beautiful and very distinct *Clematis chrysocoma* which has since flowered and been figured for the Botanical Magazine.

Messrs. Veitch have, as usual, been generous donors of their new Chinese plants and through them the following have been added to the Kew collection: *Meliosma cuneata*, *Picea complanata*, *Pterocarya hupehensis*, *Rosa Willmottiae*, *Rhododendron nigro-punctatum*, *Viburnum theiferum*, *V. buddleifolium* and *V. Davidii*, *Lonicera yunnanense*, *Tsuga yunnanense*.

From the Japanese authorities at the recent exhibition at Shepherd's Bush several Japanese trees, shrubs and seeds were received, amongst which the most noteworthy were two specimens of the Japanese Douglas fir (*Pseudotsuga japonica*); although in rather poor health they are on their own roots and hitherto this conifer has only been known in Britain by a few miserable grafted plants.

A packet of seeds of *Picea Breweriana*, hitherto the rarest of spruces, was sent by Miss Alice Eastwood, and germinated freely. Cuttings of *Populus Thevestiana* were brought from Algeria by the Assistant Director, some of which have taken root. This poplar is very distinct in its white bark and fastigiate habit.

Waterfowl.—During the past year several additions by presentation and exchange have been made to the collection of Waterfowl in the Royal Botanic Gardens. They include—

A pair of black swans presented by the Royal Zoological Society, Dublin.

Two pairs of Garganey teal presented by H.M. Office of Works.

A pair of Magellan geese received in exchange from Col. C. G. Tottenham, Ballycurry, Ashford, Co. Wicklow, Ireland.

A pair of white-faced tree-ducks.

A pair of hybrid yellow-billed ducks, a red-crested Pochard drake and a maned goose received in exchange from the Zoological Society of London.

A Mandarin duck, a pair of common teal and two pintail ducks received iu exchange from Messrs. McLean & Wormald, East Dereham, Norfolk.

A red-crested Pochard duck received in exchange from Mr. C. E. Inglis, Ball's Grove, Grantchester, Cambridge.

The black-necked swans nested again on one of the islands in the Lake and laid three eggs; two young birds were hatched, but only one was reared, which, unfortunately, got killed when four weeks old. Other birds reared at Kew during the year include 15 Carolinas, 4 sheldrakes and several call ducks, tufted ducks and the black variety of the mallard.

A pair of storks have been reared as usual.

Fish.—Some interesting varieties of Goldfish were presented to Kew at the close of the Japan-British exhibition by the Tokyo Goldfish Trader's Association. These Goldfish are kept as pets and various transformed species are produced by the Japanese which are described in the official handbook of the Fisheries section of the Exhibition. The forms presented to Kew include a curious black variety with highly developed eyes and fins, called Demekin, and several goldfish with fan tails, the Shukin and Ranchin varieties and others. They have been placed in the lily tank in the T. range.

Some Golden Orfe have also been received in exchange from Mr. R. Beale, Raynes Park, S.W.

Official Visits.—During the past year the vote for travelling expenses has been utilised as follows :—

The Director.—As Representative of Great Britain at the "1er Congrès International d'Agronomie Tropicale," at Brussels.

The Assistant Directer.—In connection with a visit to the Jardin d'Acclimatation, Villa Thuret, Antibes, and to the gardens of Lady Hanbury, La Mortola, Ventimiglia.

The Curator.—To visit various gardens and horticultural exhibitions in Belgium and Holland.

The Assistant Curator.—For the purpose of visiting the Arnold Arboretum of Harvard University, the New York Botanic Gardens, and other botanical establishments in N. America.

The Keeper of the Museums.—To study museum collections in Belgium and to visit various commercial centres in the North of England in connection with economic botanical enquiries.

Mr. Holland, Assistant in Museums.—To visit Hull in connection with the importation of botanical products, and to attend a meeting of the Museums Association at York.

Mr. Dallimore, Assistant in Museums.—To take part in the excursion of the Royal Scottish Arboricultural Society for the study of forestry in the Western Highlands of Scotland.

Mr. Cotton, Assistant in the Herbarium.—In connection with the Survey of Clare Island, Ireland, and also towards the investigation of the growth of *Ulva latissima* in relation to sewage in Belfast Lough and on the South Coast of England.

Museums.—In a review of the work for the past year special mention must be made of the opening to the public, in June last, of the collection of exhibits illustrating British Forestry which is housed in Cambridge Cottage, formerly the residence of H.R.H. the late Duke of Cambridge. During the past few years through the kindness of numerous contributors whose donations have already been duly recorded in the *Bulletin*, it has been possible to acquire the material necessary to form the nucleus of such a collection.

At the close of the Japan-British Exhibition, held at Shepherd's Bush, a large and interesting collection of varied products was obtained and is now being dealt with.

As in former years an exhibit was prepared, mainly from material obtained from the Arboretum, and forwarded to the Bath and West and Southern Counties Society's Show, held at Rochester.

In the past year 175 contributors have presented a considerable number of miscellaneous products to the Museum, the more important donations having been, from time to time, recorded in the *Bulletin*. All available and fully labelled duplicate specimens have been distributed to various institutions including the following :—Museum, County Borough of Bolton ; Muncipal Museum, Warrington ; Natural History Museum and Art Gallery, Bristol ; Corporation Art Gallery, Oldham ; Museum, Botanic Gardens,

Sydney ; Forestry Department, University of Aberdeen ; Museum, Forest of Dean, &c.

As in previous years much of the time of the Museum Staff has necessarily been devoted to dealing with the increasing number of products received from commercial firms, colonial correspondents and others, for determination and for general information as to their properties and uses.

The rearrangement of specimens rendered necessary owing to the formation of a collection to illustrate British Forestry, and the alterations called for in connection with the reception of the Taitokuin Shrine [*Kew Bull.*, 1910, p. 396], have delayed the issue of a new edition of the Guide to the Timber Collection.

A much needed work was commenced in Museum No. I. where a third of the number of cases have been re-polished.

Individual members of the Staff attended the Tropical Products Congress at Brussels, the Meeting of the Museums Association at York, and the Annual Excursion of the Royal Scottish Arboricultural Society to the Fort William District of Scotland.

Presentations from the Japan-British Exhibition.—In the dispersal of the large collections of Vegetable Products exhibited in the Japanese section of the Japan-British Exhibition held at Shepherd's Bush last year, the Commissioners in charge of the several sections have liberally presented much valuable and interesting material to the Museums of the Royal Botanic Gardens.

This when carefully selected and arranged in the Museums will go far to form complete representative series of the varied products of Japan, Formosa, Corea and Manchuria.

Special mention must be made of the Japanese Agricultural Section, presented in its entirety to the Board of Agriculture and Fisheries and transferred by the Board to Kew. From this collection, which includes food products, fruits preserved in fluid, fibres, matting materials, straw and straw-plaits, specimens illustrating plant diseases, &c., a large selection must necessarily be retained.

From the Forestry Section the bulk of the material asked for was obtained, including sections from a series of timber specimens cut to show the radial and tangential surfaces; a collection of bamboos; samples of several forms of edible fungi including "Shitake" or Jew's Ear fungus (*Hirneola polytricha*) largely consumed as food in China and Japan, together with illustrations showing its cultivation on tree trunks in Japan ; specimens of the wood and shavings of *Cupressus obtusa* with examples of fabrics and other articles made from the shavings; wood and shavings of *Acanthopanax sciadophylloides* applied to uses similar to those of the above mentioned; berries of the Haze tree (*Rhus succedanea*) and wax obtained from the berries; tapped stems of the Lacquer tree (*Rhus vernicifera*), and a photograph to illustrate the method employed in tapping the stems for the collection of Lacquer ; galls formed on *Rhus semialata*, together with a coloured drawing of the same. Other valuable material was obtained from this Section, including a collection of Forest tree seeds from the Japan Seed and Plant Company.

From the Corean Section the collection of miscellaneous vegetable products was secured, including fibres, food grains, tobacco, ginseng, and a series of timbers.

The Formosan Section contained a particularly interesting and varied series of products. Among those especially desired and obtained for the Museums the following may be noted :—Stem of the Bird-lime tree (*Trochodendron aralioides*); stem and rubber of *Ecdysanthera utilis*; Rice paper products consisting of stems, pith, sheets of pith prepared for the use of artists and for the manufacture of artificial flowers, and plaits formed of the pith for use in millinery; samples of tea, sugar cane, various fibres and fabrics; some fine examples of hats in imitation of the Panama hat, made from the prepared leaves of the Areca Nut Palm (*Areca Catechu*), and from a species of *Pandanus*, and some hats of the "Taiko" rush, a darker coloured material, so far undetermined.

The Manchurian collection of Agricultural Products containing much material of value for the Museum collections was secured, together with several oil vessels used in the Soy bean industry, samples of bean cake and a coloured photograph to illustrate the shipping of bean cake from Dairen. These latter were presented by the South Manchurian Railway Company.

The Japan Exhibitors' Association presented a neatly made tub in which Soy is packed for export.

The Japanese Educational Section presented several cases of insects injurious to plant life, together with some examples of abnormal growths and thirty small sections of timber exhibited by the Morioka Higher School of Agriculture and Forestry; some interesting photographs and a book of impressions of type leaves of *Morus alba* from the Osaka Agricultural School were also presented. Two cases of plant diseases from the University of Tohoku, Sapporo, were at the request of Prof. Miyabe likewise transferred to Kew.

Research in Jodrell Laboratory in 1910 :—

Bancroft, C. K.—Researches on the Life-history of Parasitic Fungi. (Ann. Bot., Vol. XXIV., pp. 359–372, t. 24.)

Bancroft, C. K.—A Disease of the Cacao Plant. (Kew Bull., 1910, pp. 93–95.)

Bancroft, C. K.—The Brown Rot of Tomato. (Journ Board Agric., Vol. XVI., p. 1012.)

Boodle, L. A.—Galls on an Indian Grass. (Kew Bull., 1910, pp. 69–73, with one plate.)

Georgevitch, P.—*Bacillus thermophilus vranjensis.* (Archiv für Hygiene, Bd. LXXII., pp. 201–210.)

Georgevitch, P.—Preliminary note on Apospory and Apogamy in *Trichomanes Kaulfussii*, Hk. et Grev. (Ann. Bot., Vol. XXIV., pp. 233–234.)

Georgevitch, P.—Aposporie und Apogamie bei *Trichomanes Kaulfussii*, Hk. et Grev. (Jahrb. für wiss. Bot., Bd. XLVIII., pp. 155–170, with 30 Figs. in text.)

Groom, P.—Remarks on the Oecology of Coniferae. (Ann. Bot., Vol. XXIV., pp. 241–269.)

Lawson, A. A.—The Gametophytes and Embryo of *Sciadopitys verticillata*. (Ann. Bot., Vol. XXIV., pp. 403–421, tt. 29–31.)

[**Massee, G.**]—Leaf Diseases of Celery. (Journ. Board Agric., Vol. XVI., pp. 1,010–1,011, with Figs. in text.)

[**Massee, G.**]—Wart Disease of Potatoes checked by "Greening." (Journ. Board Agric., Vol. XVII., pp. 46–47.)

[**Massee, G.**]—A Disease of Fig Trees. (Journ. Board Agric., Vol. XVII., pp. 47–49, with one Fig. in text.)

[**Massee, G.**]—Shot-hole Fungus (*Cercospora circumscissa*, Sacc.). (Journ. Board Agric., Vol. XVII., pp. 211–214, with half a plate.)

[**Massee, G.**]—Cauliflower Disease of Strawberries. (Journ. Board Agric., Vol. XVII., p. 214, with half a plate.)

[**Massee, G.**]—Tomato and Potato Bacteriosis. (Journ. Board Agric., Vol. XVII., pp. 297–299, with one plate.)

[**Massee, G.**]—Strawberry Leaf-Spot. (Journ. Board Agric., Vol. XVII., pp. 476–477, with one plate.)

[**Massee, G.**]—On the Occurrence of "Crown-Gall" in England. (Journ. Board Agric., Vol. XVII., pp. 617–620, with one plate.

Massee, G.—Crown-Gall (*Dendrophagus globosus*, Tourney). (Kew Bull., 1910, pp. 309–312, with one plate.)

[**Massee, G.**]—Powdery Mildew of Peach and Cherry. (Journ. Board Agric., Vol. XVII., pp. 652–653, with one plate.)

Scott, D. H. and **Maslen, A. J.**—On *Mesoxylon*, a New Genus of Cordaitales. Preliminary Note. (Ann. Bot., Vol. XXIV., pp. 236–239.)

Stephens, E. L. and **Sykes, M. G.**—Preliminary Note on Apogamy in *Pteris Droogmantiana*. (Ann. Bot., Vol. XXIV., p. 487.)

Worsdell, W. C.—The Rhizophore of *Selaginella*. (New Phytologist, Vol. IX., pp. 242–253, with two Figs. in text.)

Mr. C. K. Bancroft completed his study of *Cladosporium herbarum*, and carried on other mycological researches : see above.

Mr. L. A. Boodle finished an investigation on an insect-gall on a grass (*Ischaemum pilosum*), and studied the floral histology of *Foetidia mauritiana*, and continued some cultural experiments with seedlings : see above.

Mr. R. C. Davie studied the anatomy of *Peranema cyatheoides*, Don, an Indian Fern, with the object of determining its true affinities.

Mr. J. Fraser, on behalf of Lord Avebury, continued the study of pollen, begun in the previous year.

Mr. A. J. Maslen completed his work on the anatomy of *Mesoxylon Sutcliffii* : see above.

Dr. T. Nicoloff investigated some points in the anatomy of the secondary wood in Dicotyledons.

Mr. H. Takeda studied the floral structure of *Achlys*, and the characters of the seed in some species of *Cerastium*.

Mr. W. C. Worsdell continued his investigations on the vascular anatomy of the Dicotyledons, more particularly the Cucurbitaceae.

Pathology.—The number of reports issued continues to increase yearly, and the samples of material received, as well as the tone of the queries, clearly indicate that farmers and horticulturists are beginning to realise that parasitic fungi and injurious insects are factors that cannot be ignored with impunity. "Corky Scab," caused by *Spongospora solani*, has been the most prevalent disease of potatoes during the past year. "Crown-Gall," an infectious disease, forming large galls at the collar or on the roots of many economic trees and plants, has been seen on plum, rose, chrysanthemum, raspberry and loganberry, during the past year.

Much time has been devoted to the investigation of algae and fungi occurring in sewage, and contaminated sea and river water. The investigation, commenced the previous year, on the fungi causing discoloured spots on chilled beef from Argentina, has been continued.

A considerable amount of diseased material, more especially cacas, rubber plants, oranges and pineapples has been received at Kew for investigation, from the Cape of Good Hope, Natal, West Indies, Singapore, Federated Malay States, New Zealand, etc.

Additions to the Herbarium during 1910.—During the year rather more than 16,000 specimens were received as donations or exchanges, while 11,350 were acquired by purchase. The principal collections are enumerated below.

EUROPE. *Presented* :—Fungi, by Abate G. Bresadola.

Purchased :—E. M. Holmes, "Algae Britanicae Rariores Exsiccatae," fasc. 12; H. Sydow, "Mycotheca Germanica," fasc. 18–19; W. Tranzschel and J. Serebrianikow, "Mycotheca Rossica," fasc. 1–2; A. Kneucker, "Gramineae et Cyperaceae Exsiccatae"; Fiori, Béguinot and Pampinini, "Flora Italica Exsiccata," Cent. xi.–xiv.

ORIENT, NORTH ASIA AND NORTH AFRICA. *Presented* :—Persia, by Mr. W. Ethelbert James; Manchuria, by the Royal Botanic Gardens, St. Petersburg; Algeria, by Mr. A. W. Hill.

Purchased :—Dr. Reno Muschler, Egypt.

CHINA AND JAPAN. *Presented* :—China, Cavalerie and Esquirol, through Monseigneur A. A. H. Léveillé; Shantung, F. N. Meyer; Japan, H. Takeda.

Purchased :—T. Taquet, Corea; E. H. Wilson, China (photographs).

INDIA AND MALAYA. *Presented* :—Burma, Mr. J. H. Lace; Tibet, Sikkim and the Malay Peninsula, by the Royal Botanic Garden, Calcutta; North-West Frontier Province, the late Sir Harold Deane through Lady Deane; specimens of Indian *Pedicularis*, by Messrs. J. R. Drummond and J. F. Duthie; Malay Peninsula, by Mr. H. N. Ridley; Siam, by Dr. A. F. G. Kerr and Mr. W. Lloyd; Philippine Islands, by Mr. E. D. Merrill; Java, by the Buitenzorg Botanic Gardens; Sumatra, etc., by Dr. R. Schlechter; Borneo, by the Sarawak Museum, through Mr. J. C. Moulton.

Purchased :—Dr. R. Schlechter, New Guinea; Mr. A. D. E. Elmer, Philippine Islands.

Australasia. *Presented*:—Western Australia, by Capt. A. Dorrien Smith; Queensland Marine Algae, by Mr. F. M. Bailey; New Zealand, by Mr. T. F. Cheeseman and Mr. L. Cockayne.

Tropical Africa. *Presented*:—Northern Nigeria, by Mr. B. E. B. Shaw; Sudan, by Mr. and Mrs. A. F. Broun; Abyssinia and Somaliland, by Dr. R. E. Drake-Brockman; British East Africa, by Mr. E. Battiscombe; Uganda, by Mr. M. T. Dawe and Mr. R. Fyffe; the Roosevelt Expedition, through Mr. Gerrit S. Miller; Swaziland, by Miss M. M. Stewart; Rhodesia, by Mrs. W. Craster; *Loranthaceae*, by the Royal Botanic Gardens, Berlin.

Purchased:—G. Tessmann, Spanish Guinea; G. Zenker, Cameroons; G. Scheffler, British East Africa; Rev. F. A. Rogers, North-West Rhodesia; K. Dinter, German South-West Africa.

South Africa. *Presented*:—Namaqualand, by the Percy Sladen Trustees, through Prof. H. H. W. Pearson; various localities, by Dr. R. Schlechter, Dr. Hans Schinz, Dr. S. Schönland, Mr. E. E. Galpin and Mr. E. P. Phillips.

Purchased:—Miss Alice Pegler, Kentani; W. Tyson, "Marine Algae," fasc. 1–2.

North America. *Presented*:—British Columbia, by Miss E. M. Warren; United States, by the Smithsonian Institution, Washington, and the Field Museum, Chicago.

Purchased:—E. J. Palmer, Missouri *Crataegi*; Miss Alice Eastwood, Santa Barbara, California; A. H. Brinkman, Canadian mosses; F. S. Collins, "Phycotheca Boreali-Americana" fasc. 33.

Mexico. *Purchased*:—C. R. Orcutt.

West Indies. *Presented*:—Bahamas and Jamaica, by the New York Botanical Gardens.

Purchased:—H. Türckheim, San Domingo.

South America. *Presented*:—British Guiana, by Prof. J. B. Harrison, C.M.G.; South Brazil and Chile, Mr. G. M. Hall.

Purchased:—Dr. E. Hassler and K. Fiebrig, Paraguay.

Sir G. Watt has presented the original drawings, as well as many specimens of *Gossypium*, used in the preparation of his book on "The wild and cultivated Cotton Plants of the World." An extensive set of Manchurian plants, collected largely by Komarow, has been received from the Royal Botanic Gardens, St. Petersburg. A collection of nearly 800 photographs taken in China by Mr. E. H. Wilson gives a good idea of the vegetation of the region traversed by him; some of these views have been reproduced in the Kew Bulletin. The Indian specimens of *Pedicularis* presented by Mr. J. R. Drummond and Mr. J. F. Duthie have been named by Monsieur G. Bonati, who is making a special study of the genus. Mr. J. F. Lace's collection is represented by nearly a thousand specimens. Dr. A. F. G. Kerr has continued sending plants from Chiengmai in Siam, and also one set collected during an expedition to Muang Phre, south-east of Chiengmai. Amongst the plants sent from the Philippine Islands by Mr. E. D. Merrill are some orchids named by Mr. Oakes Ames. Mr. T. F. Cheeseman has presented some of the specimens used in the preparation of his "Illustrations of the New Zealand Flora." An interesting collection, containing many Cryptogams, from South Chile, has been presented by Mr. G. M. Hall.

In addition to the numbers mentioned above, about 8000 specimens have been received on loan from various institutions, chiefly for use in the preparation of the Flora of Tropical Africa and the Flora Capensis.

Presentations to the Library during 1910.—One of the more important of the contributions made to the Library during the year is a copy of the rare and valuable work on roses by Miss Mary Lawrance, for which the establishment is indebted to the Bentham Trustees. Its full title is: *A collection of Roses from Nature*; published by Miss Lawrance, Teacher of Botanical Drawing. The title-page bears the date 1799, but the plates, of which there should be 90, in addition to a coloured frontispiece, are variously dated from 1796 to 1799. Perfect copies of the work appear to be very rare, and the Kew copy is deficient in the frontispiece and plate 1. The volume is a nearly square folio standing 19 inches high. The coloured drawings, though somewhat adversely criticised by Redouté, "parce que, dans un grand nombre d'occasions, le peintre a sacrifié la vérité aux formes pittoresques," have considerable merit as works of art.

The Bentham Trustees have also presented a copy of *Der orientalisch-indianische Kunst- und Lust-Gärtner*, by G. Meister, published in Dresden in 1692. It is a small quarto volume containing many curious observations on fruit and fruit-culture, amongst other things, made by the author during his travels to Japan through India, Siam, Java, &c. From the same source have been received the following: *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer Valdivia*, 1898–1899, Bd. ii. Teil iii. *Das Kapland*, by R. Marloth, Jena, 1908; two copies of the fifth volume of *The Trees of Great Britain and Ireland*, by H. J. Elwes and A. Henry; *Nova Acta Academiae C. L.-C. G. Naturae Curiosorum*, vols. 85–89, in continuation; 16 volumes comprising travels in South America and the little known *Flora de Colombia* by Santiago Cortes, Bogotá, 1897; and the issues for the year of nearly thirty serial or periodical works, continuing sets which in most cases have been added to the library by the Bentham Trustees.

The Trustees of the British Museum have presented the third volume (L–O) of the fine *Catalogue of the Library of the British Museum* (*Natural History*), and the first volume of the *Flora of Jamaica*, by W. Fawcett and A. B. Rendle. This volume includes the Orchidaceae.

Through the kind offices of Mr. R. T. Tower, C.V.O., H.M. Minister, Mexico, numerous additions of Mexican publications have been received from the Acting Secretary of Fomento, Mexico, and the Librarian of the Instituto Médico Nacional de México. These include *Materia medica mexicana* (1904), and *Abrêgé de matière médicale du Merique* (1909), by F. Altamirano; *Manual terapeutico de plantas mexicanas* (1909), by L. Flores; *Curso de historia de drogas* (1902), by J. M. Noriega; and *Estudios de historia natural* (1904), by J. Ramírez.

A handsome volume and a very important contribution is the *Pteridografía del Sur de México*, by the late Señor J. N. Rovirosa. This has been received from Dr. J. Sánchez and Dr. M. M. Villada, who have communicated it in the name of Señor J. D. Casasús through whose generosity the publication of the work was secured.

Dr. Hans Schinz has presented the botanical publications of the University of Zurich, as well as *Die fossilen Pflanzenreste des glazialen Delta bei Kaltbrunn*, &c. (1910), by H. Brockmann-Jerosch, and a dissertation by E. Hess *Ueber die Wuchsformen der alpinen Geröllpflanzen* (1909).

The Compagnie du Kasai, Brussels, has issued a quarto volume recording the results of the botanical and agricultural researches of the company in the Kasai Region of the Belgian Congo, the material having been arranged and annotated by Dr. E. De Wildeman. The Compagnie du Kasai has presented a copy of the work to the library. From the Ministère des Colonies, Belgium, have been received *Sylloge florae congolanae* (1909), by Th. Durand and Hélène Durand, and *Notes botaniques sur la région du Bas- et Moyen-Congo*, fasc. 1 (1910), by J. Gillet and E. Pâque. The last named forms part of the *Annales du Musée du Congo*, of which all the botanical series have reached the library from the same source.

Two copies of the *Florae Libycae Prodromus*, by E. Durand and G. Barratte, a fine quarto volume containing twenty plates which are chiefly the work of that skilled artist Mr. d'Apreval, have been received, one from Madame Gallice in memory of her lamented brother, Dr. E. Durand, and the other from the Herbier Boissier.

Sir J. D. Hooker, O.M., G.C.S.I., has presented Landon's work, *Lhasa* (1905), and the continuation of numerous periodical publications.

A well-bound set of the *Revue des Eaux et Forêts*, comprising volumes 10 to 44 (1874–1905), has been presented by Mr. J. S. Gamble, C. I. E., and Mr. W. A. Talbot, has made a presentation of a copy of his fine *Forest Flora of the Bombay Presidency and Sind*, vol. 1 (1909).

A collection of 113 sectional maps of the Sudan have been received through the kind offices of Mr. A. F. Broun, Director of Woods and Forests to the Sudan Government.

The establishment is especially indebted to Mr. J. R. Drummond, for a transcript of the lists of determinations, localities and other information, contained in Mr. J. F. Duthie's Field Books relating to the collections of plants in the herbarium formed by Mr. Duthie for the Botanical Department of Northern India of which, up till 1903, he was Director. This herbarium, formerly at Saharanpur, is now at the Imperial Forest Research Institute, Dehra Dun. The transcript, which fills eight quarto volumes, each of about three hundred pages, has been made under Mr. Drummond's personal supervision and entirely at his expense.

The late Dr. John Lowe at the time of his death had accumulated a great amount of material in the form of manuscript notes, cuttings from books and papers and other matter with the intention of issuing a second edition of his monograph, *The Yew Trees of Great Britain and Ireland*. In this work he was assisted by Mrs. Lowe, who continued it after his death, with the co-operation of Mr. Augustine Henry and others. Unfortunately Mrs. Lowe did

not live to complete the preparation of the new edition and at her decease the project was abandoned. All the material collected, and this has been to some extent arranged by Mr. Henry, together with an annotated copy of the first edition of Dr. Lowe's book, has been presented to the library by Mrs. Lowe's executors.

The complete list of accessions to the library during the year, including many important presentations which it has not been possible to mention in this note, will form Appendix II to the current volume of the *Kew Bulletin*.

Bamboos cultivated at the Royal Botanic Gardens, Kew.—From time to time enquiries are received with regard to the species of *Bambuseae* in cultivation at Kew ; a revised census of these, based on the Kew Handlists, and brought up to date, is therefore here given for general information.

Arundinaria anceps, *Mitford.*
" argenteo-striata, *Hort.*
" aristata, *Gamble.*
" auricoma, *Mitford.*
" chrysantha, *Mitford.*
" falcata, *Nees.*
" " var. glomerata, *Gamble.*
" Falconeri, *Mitford.*
" Fortunei, *A. & C. Rivière.*
" Hindsii, *Munro.*
" " var. graminea, *Bean.*
" Hookeriana, *Munro.*
" humilis, *Mitford.*
" intermedia, *Munro.*
" japonica, *Sieb. & Zucc.*
" khasiana, *Munro.*
" Kokantsik, *Kurz.*
" Kumasasa, *Kurz.*
" macrosperma, *Michx.*
" " var. tecta, *A. Gray.*
" nitida, *Mitford.*
" pumila, *Mitford.*
" pygmaea, *Kurz.*
" racemosa, *Munro.*
" Simoni, *A. & C. Rivière.*
" " var. Chino, *Makino.*
" " " variegata, *Hook. f.*
" Veitchii, *N. E. Brown.*
Bambusa "Alphonse Karrii," *Hort.*
" angustifolia, *Mitford.*
" arundinacea, *Willd.*
" disticha, *Mitford.*
" himalayensis, *Hort.*
" macroculmis, *A. Rivière.*
" Nagashima, *Marliac.*
" nana, *Roxb.*
" " var. variegata, *Hort.*
" nepalense, *Hort.*

Bamboos cultivated at the Royal Botanic Gardens, Kew.—*cont.*

Bambusa quadrangularis, *Fenzi.*
" tessellata, *Munro.*
" vulgaris, *Schrad.*
" " var. striata, *Lodd.*
Cephalostachyum flavescens, *Kurz.*
" pergracile, *Munro.*
Dendrocalamus giganteus, *Munro.*
" latiflorus, *Munro.*
" sikkimensis, *Gamble.*
" strictus, *Nees.*
Gigantochloa atra, *Kurz.*
Melocanna bambusoides, *Trin.*
Olyra floribunda, *Raddi.*
Oxytenanthera abyssinica, *Munro.*
" albo-ciliata, *Munro.*
Phyllostachys aurea, *A. & C. Rivière.*
" bambusoides, *Sieb. & Zucc.*
" fastuosa, *Hort.*
" flexuosa, *A. & C. Rivière.*
" fulva, *Mitford.*
" Henonis, *Mitford.*
" mitis, *A. & C. Rivière.*
" nigra, *Munro.*
" " var. Boryana, *Hort.*
" " " Castillonis, *Hort.*
" " " punctata, *Bean.*
" puberula, *Munro.*
" Quilioi, *A. & C. Rivière.*
" " var. Marliacea, *Mitford.*
" ruscifolia, *Hort. Kew.*
" sulphurea, *A. & C. Rivière.*
" violascens, *A. & C. Rivière.*
" viridi-glaucescens, *A. & C. Rivière.*
Schizostachyum Zollingeri, *Steud.*

Botanical Magazine for January.—The plants figured are *Dendrobium Dartoisianum*, De Wildem. (t. 8352); *Cladothamnus pyrolaeflorus*, Bongard (t. 8353); *Aquilegia flabellata*, Sieb. & Zucc. var. *nivea*, Hort. (t. 8354); *Aster Falconeri*, Hutchinson (t. 8355); and *Phaedranassa Carmioli*, Baker (t. 8356). The fine *Dendrobium* was discovered in 1905 in Indo-China and was introduced by Mr. G. Brouckart with another species from Annam bearing his name (t. 8252). *D. Dartoisianum* is most nearly allied to *D. tortile*, Lindl. The Kew plant was purchased in 1906 from Mr. M. Verdonck, of Ghent. The *Cladothamnus* is an interesting little Ericaceous shrub found growing along the borders of upland meadows in Alaska. The corolla is almost polypetalous, whereas in the allied species *C. campanulatus*, Greene, from the mountains of British Colombia and Washington there is a short corolla-tube. *C. pyrolaeflorus* was discovered on the island of Sitka by Dr. Martens in 1828. The material for the illustration was supplied by Mr. T. Smith, Daisy Hill Nursery, Newry. The *Aquilegia* is a white-

flowered form of the Japanese *A. flabellata*, which was sent to Kew by Canon Ellacombe, Bitton, Bristol, in May, 1909. Finet et Gagnepain suggest that *A. flabellata* may be only a variety of *A. sibirica*, Lam. but from the gardening point of view the plants are sufficiently distinct. *Aster Falconeri*, a native of the mountains surrounding the valley of Kashmir is a remarkably handsome species. It was originally considered identical with *A. diplostephoides*, Benth., from Sikkim and E. Nepal. Messrs. Barr introduced *A. Falconeri* to cultivation in 1906, and kindly presented seeds to Kew. The plants flowered in May, 1910, but the material for the illustration was provided by Mr. W. Marshall, Auchinraith, Bexley.

The genus *Phaedranassa* which furnishes the subject for the last illustration, *P. Carmioli* from Costa Rica, includes four other species from the Andes of Ecuador or Colombia. The flowers are striking with their long red perianth tubes and yellow-edged, green lobes. *P. Carmioli* was introduced by Mr. Jules Carmiol, and was first flowered in 1867. The plant figured was received from Mr. W. E. Gumbleton, Belgrove, Queenstown, to whom the bulb had been sent two years previously by Mr. W. E. Ledger, Wimbledon.

Pseuderanthemum malaccense, *Lindau* in Engl. & Prantl, Nat. Pflanzenf. iv. 3[B], p. 330.—This combination rests on *Eranthemum malaccense*, C. B.Cl.; but as Clarke himself at different times had different conceptions of that species, and as *E. malaccense* has, moreover, recently been referred to as a synonym of *E. graciliflorum*, Nees, it seems desirable to define the species. The name *Eranthemum malaccense* appears for the first time in C. B. Clarke's elaboration of the Acanthaceae for the Flora of British India, iv, p. 498 (1885). The specimens especially referred to it are "Griffith (Kew Distr. 6175), Cuming 2357, 2389, etc." They are all at Kew, and their comparison shows that one sheet of Griffith, namely, 6175, and Cuming, 2389, are conspecific whilst Cuming, 2357, represents another species. As to the synonyms quoted by Clarke, they are :—"*Eranthemum crenulatum*, Nees in Wall. Pl. As. Rar. iii, 107 and in DC. Prodr. xi, 453, chiefly; T. Anderson in Journ. Linn. Soc. ix. 523, partly (not of Lindl.); *E. palatiferum* Bot. Mag. t. 5957, left-hand fig. only; *Justicia orbiculata*, Wall. Cat. 2489, letter *b*; and from a note, possibly *E. punctatum*, Nees in DC. Prodr. xi. 455." When Clarke worked out the Acanthaceae for King and Gamble's Materials for a Flora of the Malayan Peninsula (Journ. As. Soc. Bengal, lxxiv, part ii, 1907) he considerably revised his determinations and quotations. He retained only Cuming's 2389 and a part of Griffith's 6175 in *E. malaccense*, referring Cuming 2357, to his *E. porphyranthos*, and the remaining part of Griffith's 6175, to *E. album*. At the same time he cut out all the synonyms quoted above with the exception of *E. crenulatum*, Nees "(in large part)," non Lindley. On the other hand, he added a considerable number of specimens, of which the following are at Kew :—Wellesley, *Ridley*, 2231; Malacca, *Harvey*; *Goodenough*, 1713; Mt. Ophir, *Lobb*. They are all conspecific with Cuming, 2389, and one of the Kew Distribution sheets of Griffith's collection numbered 6175. He further introduced

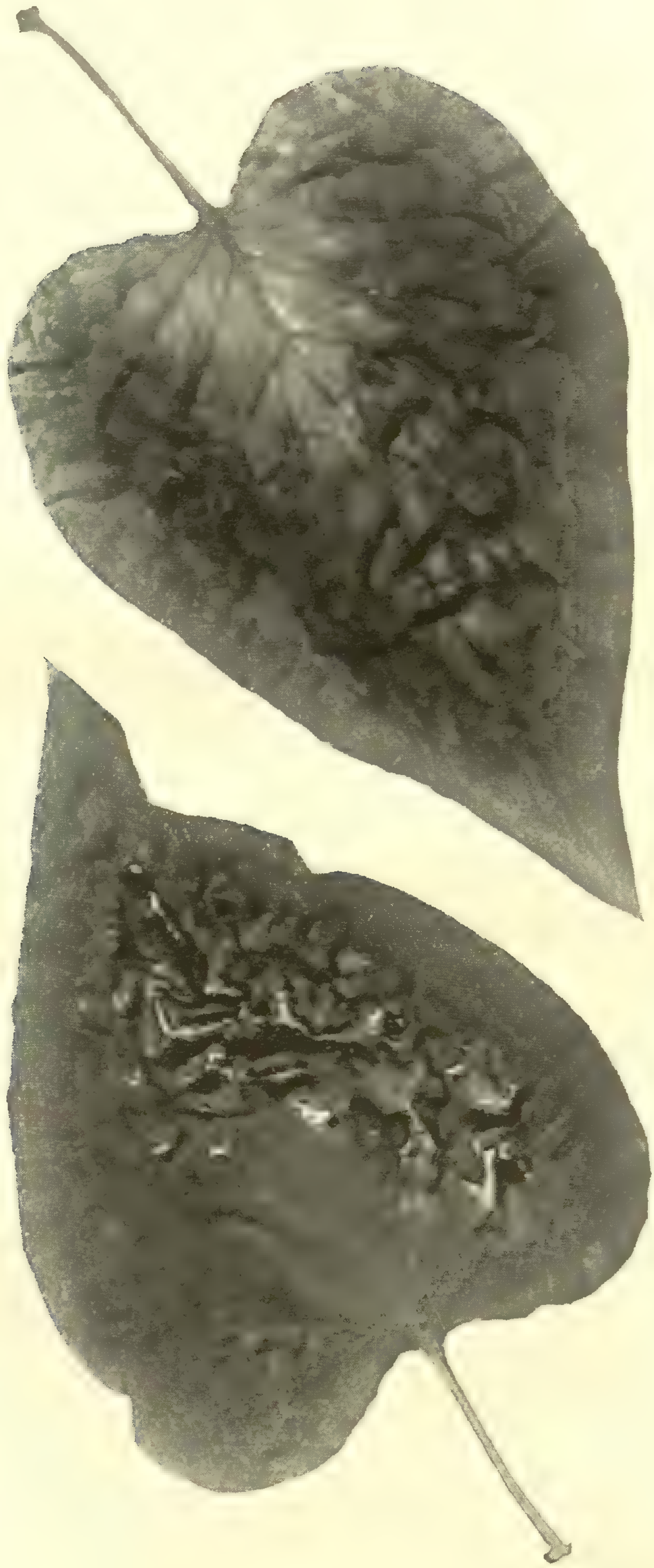
several new synonyms, namely *E. erectum*, T. Anders., *E. crenulatum* var. *grandiflorum*, T. Anders. and *E. Blumei*, T. Anders. (non Nees) ; but as these are all "nomina nuda," they need not be taken into consideration in this place, and the less so as they are not supported by any specimens in the Kew collections. *Eranthemum crenulatum*, however, requires some explanation. The plant originally so named by Wallich and figured in the Botanical Register, tab. 879, is undoubtedly Clarke's *E. porphyranthos* (in King and Gamble's Materials, p. 885, reprint p. 675), a native of Penang and Perak, and not of Silhet as Lindley believed, whilst *E. crenulatum*, Nees in Wall. Pl. As. Rar. iii, p. 107, is a mixture of several species, comprising *inter alia* Clarke's *E. malaccense*, as exemplified by Cuming's 2389, and by Lobb's and Griffith's specimen, all of which Nees quotes under his *E. crenulatum* var. *angustifolium*. The only synonym Nees mentions in connection with this variety is *Justicia orbiculata*, Wight in Wall. Cat. 2489, which Clarke also quoted under *E. malaceense* in the Flora of British India, l.c., whilst in the "Materials" it is referred to *Eranthemum album*, and in all probability rightly so.

Accepting Clarke's identifications in the "Materials," with the exception of a specimen from Siam, which is certainly specifically distinct, the area of his *Eranthemum malaccense* (= *Pseuderanthemum malaccense*, Lindau), covers the greater part of the Malay Peninsula from Kedah to Johore.

Not long ago Clarke's *E. malaccense* was identified by Beddome (in Journ. Hort. Soc., xxxiv. p. 71) with *E. graciliflorum*, Nees in Wall., Pl. As. Rar. iii. p. 107 and *E. punctatum*, Nees in DC. l. c. p. 455. The first is based on a specimen collected by Porter in Penang and preserved in Wallich's herbarium (2427) at the Linnean Society. The specimen is in a bad state of preservation with the corollas eaten away. Its leaves are larger than in any of the specimens of *P. malaccense* I have seen (up to 17 cm. by 3·5 cm.) and the petioles vary from 3–8 cm., instead of 1–2 cm. Nor is the pubescence of the stem of exactly the same nature as in *E. malaccense*, and the colour of the corolla is stated to be rose. To include Porter's specimen in Clarke's *E. malaccense*, involves the assumption of a range of variation which is by no means suggested by the material which I have seen of that species, which is remarkably homogeneous. In view of this and of the imperfect condition of the type of *E. graciliflorum*, I do not feel justified in accepting the reduction of *E. malaccense*, C.B. Cl., to *E. graciliflorum*, Nees. As to *E. punctatum* Nees, this was described from a plant of unknown origin grown in the Breslau Gardens. There are no specimens of it at Kew. The description, apart from the length (1–8 cm.) and colour of the corolla (pale red with purple confluent dots on the anticous middle lobe), suggests indeed *E. malaccense*, C.B. Cl., and it is just possible that the two are synonymous.

A description with revised references to literature and synonymy and a plate drawn from a specimen cultivated at Kew will appear at an early date in the Botanical Magazine.

O.S.



HELMINTHOSPORIUM SYRINGAE.

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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 2.] [1911.

V.—A DISEASE OF THE LILAC.

(*Helminthosporium syringae*, Klebahn.)

G. Massee.

The comparatively sudden appearance of epidemics due to fungi, although of frequent occurrence, is but little understood, and in most instances no explanation whatever can be offered as to the cause of such appearance. Among epidemics of recent occurrence in this country may be mentioned "Corky Scab" of the potato caused by *Spongospora scabies*, Mass. This fungus, described by Berkeley, more than half a century ago, as occurring on potatoes, was not seen again by any mycologist for many years, until it suddenly reappeared in the form of a serious epidemic of potatoes in this country and in Ireland, some few years ago.

As another example may be cited the common *Euonymus japonicus*, L., an evergreen shrub that has been in cultivation in this country for many years. Until about 10 years ago it had been remarkably free from diseases caused by fungi, when suddenly and almost simultaneously, along the south coast, where the shrub is largely cultivated, it was attacked by a white mildew to such an extent that the bushes often presented the appearance of having been whitewashed. The mildew, *Oidium Euonymi-japonici*, Sacc., appears to flourish best in the vicinity of the sea, as up to the present it has failed to establish itself inland. The American Gooseberry Mildew, *Sphaerotheca mors-uvae*, Schw.; Black scab of potatoes, *Synchytrium endobioticum*, Percival; Celery leaf-blight, etc., also belong to this category.

Some of these diseases which have been considered as of comparatively recent occurrence, may have been known to gardeners and farmers for many years, but only during quite recent times has their true nature been understood by people generally.

Lilac bushes are the latest of victims to an epidemic caused by the fungus *Helminthosporium syringae*, Klebahn. The leaves are the part attacked and show the earliest indication of injury in a brownish stain running down each half of the leaf, at some distance from the midrib; this stain gradually spreads but appears never to extend to the edge of the leaf; the stained area becomes darker in colour,

(18721—6a.) Wt. 92—428. 1375. 3/11. D & S.

and studded with olive-black patches of the fruit of the fungus. At a later stage the diseased portion of the leaf becomes brown and dry and frequently more or less cracked or torn. Spores are produced in great abundance on diseased leaves and these are washed by rain or carried by insects, birds, etc., to other parts of the bush, resulting in the infection of practically every leaf, which, apart from the disfiguration of the bush early in the season, prevents the ripening of the wood, and generally tends to weaken the plant.

Healthy lilac leaves infected with the spores of the fungus showed the characteristic browning at the end of four days, and spores were produced in abundance on the seventh day.

Foliage sprayed with a solution of potassium sulphide (liver of sulphur) resisted infection. If bushes were sprayed with a solution of this substance half an ounce in a gallon of water, the disease could probably be held in check, provided spraying was commenced during the early stage of the disease. Diseased fallen leaves should be collected and either buried or burned.

VI.—DIAGNOSES AFRICANAE: XXXIX.

1181. **Mesembryanthemum rubrolineatum**, *N. E. Brown* [Ficoideae]; affine *M. aloidi*, Haw., sed foliis et floribus majoribus et petalis rubrolineatis facile distinguitur.

Planta succulenta, caespitosi-ramosa. *Caulis* subnullus vel aetate irregulariter subtuberiformis, irregulariter ramosus, carnosus, 1·5–2·5 cm. crassus. *Folia* 8–12 in rosulam conferta, decussata, valde patentia, libera, 2·3–5 cm. longa, 0·9–2·2 cm. lata, 5–9 mm. crassa, submolliter carnosa, trigono-oblonga vel trigono-spathulata et ultra medium subrhomboideo-dilatata, acuta, supra plana, subtus basi convexa, superne carinata sed haud gibbosa, angulis integris, glabra, sordide viridia, maculis parvis albis leviter prominulis crebre notata, interdum purpureo-tincta. *Flores* solitarii vel bini, axillares, 4 cm. diametro. *Pedunculus* 1 cm. longus, 4 mm. crassus, glaber. *Sepala* 5, subaequalia, 1 cm. longa, 8–11 mm. lata, plana, deltoideo-ovata, obtuse acuta, glabra, sordide viridia, crebre albomaculata. *Petala* numerosa, biseriata, imbricata nec laxa, 1·4–1·5 cm. longa, 2·5–3 mm. lata, lineari-lanceolata, acuta, lutea medio utrinque linea rubra notata. *Stamina* numerosa, in conum latum collecta, lutea. *Stigmata* 10, subulata, pallide viridia.

South Africa. Described from a living plant sent to the Royal Botanic Gardens, Kew, from the Botanic Garden at Graaff Reinet, Cape Colony, in 1908.

The flowers commence to open at about 11 o'clock in the morning, and begin to close at 4 o'clock in the afternoon, apparently irrespective of direct sunlight. It is closely allied to *M. aloides*, Haw., and *M. nobile*, Haw., but very distinct from both in its flowers. The leaves resemble those of the former species, but are much larger.

1182. **Protea Doddii**, *Phillips* [Proteaceæ-Proteeae]; verisimiliter *P. lanceolatae*, E. Mey., affinis, stylis et forma capituli differt.

Frutex 15–20 cm. altus. *Rami* glabri. *Folia* 4·5–5·8 cm. longa, 4·5–5 mm. lata, linearia, apice obtusa, basi angustata, indistincte

nervosa ; costa immersa, glabra. *Capitulum* sessile, 5 cm. longum, circiter 3·8 cm. latum. *Involucri bracteae* 12-seriatae ; exteriores ovatae, apice acutae vel subacutae, glabrae vel minute pubescentes, aliquando inferne ciliatae ; interiores oblongae, apice obtusae, concavae, glabrae, calycibus subaequales. *Receptaculum* paullo convexum ; paleae ovatae, apice acutae. *Calycis tubus* 2·4 cm. longus, basi dilatatus, tricarinatus et 7-nervis, glaber ; laminae 9 mm. longae, tricarinatae, glabrae ; laminae connexae apice 3-dentatae ; dentes aequales, 1·3 mm. longi. *Stamina* sessilia, 6 mm. longa ; antherae lineares, apice glandulis 0·3 mm. longis ovatis obtusis instructae. *Ovarium* 2 mm. longum, obovato-ellipticum, pilis longis vestitum ; stylus 3·2 cm. longus, linearis, unisulcatus, basi tumidus et 5-carinatus ; stigma 6 mm. longum, cylindricum, apice obtusum, basi sinuatum.

South Africa. East London Div. : between Gonubie and Quinera River, *Dodd in Herb. Galpin*, 7936.

Mr. Galpin writes that "the plant was found by . . . . . , Messrs. B. H. Dodd and John Wood, growing in open grass between the Gonubie and Quinera Rivers, about 1½ miles from the sea . . . It was only found in one small area where it is fairly abundant. None of the plants are more than 12–14 in. high. Mr. Wood has been exploring in the East London Division for the last 15 years and neither he, Mr. Dodd nor I had ever come across this plant before, so that apparently—so far as the East London District is concerned—it is restricted to this one spot and very rare."

1183. **Protea Harmeri**, *Phillips* [Proteaceæ-Proteeae]; verisimiliter *P. scolymocephalae*, Reichard, et *P. cedromontanae*, Schltr., affinis, ab illa foliis obtusis et ramis superne tomentosis, ab hac foliis brevioribus et calycis tubo superne angustiore differt.

Frutex circiter 1 m. altus ? *Rami* superne tomentosi, demum glabri. *Folia* 5–6 cm. longa, 3–3·5 mm. lata, linearia, apice obtusa, basi attenuata, subtus concava, glabra ; juniora basi tomentosa. *Capitulum* sessile, 2·5 cm. longum, circiter 2·5–3 cm. latum, globosum ; receptaculum convexum. *Involucri bracteae* 10–11-seriatae ; exteriores ovatae, apice obtusae, glabrae vel superne glabrae et inferne pubescentes ciliatae, marginibus membranaceis ; interiores oblongo-spathulatae, superne recurvae, glabrae vel minute pubescentes, stylis breviores. *Calycis tubus* 1·5 cm. longus, superne 0·75 mm. latus, basi dilatatus, 3-nervis, glaber vel superne hirsutus ; laminae 4 mm. longae, grosse pilosae, demum supra glabrae ; laminae connexae apice tridentatae ; dentes subaequales, 0·33 mm. longi, medius brevior. *Stamina* omnia fertilia, subsessilia, 3·5 mm. longa ; antherae lineares, apice glandulis 0·33 mm. longis ovatis obtusis instructae. *Squamae hypogynae* 1 mm. longae, 0·33–0·5 mm. latae, oblongae, obtusae. *Ovarium* 2 mm. longum, oblongo-obovatum, pilis longis rufis vestitum ; stylus 2·1 cm. longus, superne teres, unisulcatus, inferne planus, cavus, glaber ; stigma 2·75 mm. longum, lineare, obtusum, sulcatum, in stylum sensim angustatum.

South Africa. Worcester Div. : hill near Matjesfontein, *Harmer*, August 10th, 1905.

Named after Dr. S. F. Harmer, F.R.S., Keeper of the Zoological Department of the Natural History Museum, who collected this *Protea* during the visit of the British Association to S. Africa in 1905.

Dr. Harmer reports: "I think it was a low bush, not more than three feet high. To the best of my recollection the bracts of the involucre . . . . . were of a decided brick-red colour. The 'flower' struck me as being quite different from that of any other *Protea* I had seen; and I saw nothing like it afterwards.

1184. **Protea transvaalensis**, *Phillips* [Proteaceae - Proteeae]; affinis *P. Mundii*, Klotzsch, a qua capitulo glabro differt.

Rami glabri. *Cortex* niger, superne cinereus. *Folia* 3·8–10·2 cm. longa, 2–3·2 cm. lata, lanceolata vel obovato-lanceolata, apice obtusa, basi angustata, distincte pinnato-venosa, glabra, marginibus membranaceis. *Capitula* (immatura) sessilia, 4·5–5 cm. longa, circiter 2·5 cm. lata, oblonga; receptaculum paullo convexum. *Involucri bracteae* 10-seriatae; exteriores ovatae, subacutae vel subobtusae, inferne minute pubescentes, vel glabrae, aliquando pilis paucis ciliatae; interiores oblongae, apice obtusae, concavae, glabrae vel superne minute pubescentes, aliquando pilis paucis ciliatae. *Calycis tubus* 1·5 cm. longus, basi dilatatus, 9-nervis, glaber; laminae 1·5 cm. longae, majores apice dentatae, glabrae, minores grosse pilosae; dentes laterales 1·75 mm. longi, oblongi, hirsuti, apice ciliati; dens medius 1 mm. longus, angustior. *Stamina* subsessilia, 1 cm. longa; filamenta concava; antherae lineares apice glandulis 0·33 mm. longis ovatis tumidis instructae. *Squamae hypogynae* 0·4 mm. longae, 0·33 mm. latae, oblongae, apice obtusae. *Ovarium* 2 mm. longum, oblongum, pilis longis vestitum; stylus 1·5 cm. longus, linearis, glaber; stigma 1 cm. longum, filiforme, sulcatum, apice obtusum et minute compressum, basi paullo sinuatum.

South Africa. Transvaal: Goedgeluk, Zoutpansberg, *Burtt-Davy*, 5179.

This is a very distinct species unlike any other which I have seen. In the colour of the bark and shape of the leaves it approaches *P. Mundii*, Klotzsch, but differs from this species by the glabrous or slightly pubescent not woolly involucre-scales.

1185. **Mimetes saxatilis**, Phillips [Proteaceae-Proteeae]; species distincta, ex affinitate *M. palustris*, Knight, sed stigmate obtuso et bracteis coriaceis differt.

Rami tomentosi vel breviter villosi. *Folia* 3–4 cm. longa, 1·8–3·2 cm. lata, elliptica, obovata vel suborbicularia, obtusa, apice integra vel tridentata, dentibus obtusis, basi subcordata, indistincte 5–6-nervia, dense pubescentia, albo-ciliata. *Capitula* axillaria, sessilia, 2 cm. longa, 10–12-flora, apice ramorum conferta. *Involucri bracteae* 5–6-seriatae, oblongae, lanceolatae, vel ovatae, subacuminatae, acutae, coriaceae, rugosae, aliquid pubescentes, ciliatae. *Calycis tubus* 2 mm. longus, glaber, superne ciliatus; lobi 2·5 cm. longi, lineari-spathulati, dense pilosi parte apicali dilatata 3 mm. longa oblongo-lineari subacuta glabra excepta. *Stamina* sessilia, 4 mm. longa; filamenta oblonga, tumida, sulcata; antherae 2 mm.

longae, lineares, apice glandulis 0·5 mm. longis lanceolatis acutis concavis instructae. *Squamae hypogynae* 2 mm. longae, lineares. *Ovarium* 1 mm. longum, pubescens; stylus 3·5 cm. longus, cylindricus, basi paullo applanatus, glaber; stigma 3 mm. longum, cylindricum, apice globosum, obtusum, basi nodulosum.

South Africa. Bredasdorp Div.: Eluie, *Schlechter*, 7716; Mier Kraal, *Schlechter*, 10,521.

1186. **Sorocephalus longifolius**, *Phillips* [Proteaceae-Proteeae]; *S. imberbi*, R. Br., affinis, foliis brevioribus et ramis asperis differt.

Rami superne pilosi, demum inferne pubescentes. *Folia* 2·5–5·1 cm. longa, cylindrico-filiformia, apice acuta, mucronata, supra sulcata, infra convexa, basi plana, glabra. *Capitula* 7–9-flora, in racemis terminalibus 1·8–2·4 cm. longis 1·4–2·4 cm. latis. *Bracteae* 1·2 cm. longae, lanceolato-oblongae, acuminatae, apice acutae, inferne sparse pilosae et ciliatae. *Pedunculus* 2–4 mm. longus, villosus. *Involucri bracteae* 7–7·5 mm. longae, ovato-lanceolatae, acuminatae vel subacuminatae, apice subacutae, pilosae, dense ciliatae. *Calycis tubus* 1·8–2 mm. longus, cylindricus, basi ventricosus, superne pubescens, inferne glaber; lobi 7·5 mm. longi, spathulato-lineares, villosi, spiraliter contorti, parte apicali dilatata 1·5 mm. longa ovata obtusa ebarbigera glabra. *Stamina* sessilia, 0·75–1 mm. longa; antherae ellipticae vel oblongae, apice glandulis minutis instructae. *Squamae hypogynae* 0·66 mm. longae, lineares, apice obtusae. *Stylus* 8 mm. longus, teres, e basi ad apicem sensim angustatus, supra ovarium constrictus; stigma 0·33 mm. longum, ovatum vel ellipticum, breviter rostratum, paullo pubescens vel glabrum. *Fructus* subsessilis, 6 mm. longus, oblongus, apice obtusus.—*S. imberbis* var. *longifolius*, Meisn. in DC. Prodr. vol. xiv. p. 303.

South Africa. Swellendam Div.: banks of Zonde Einde River, near Apple's Kraal, *Zeyher*, 3718.

1187. **Sorocephalus Schlechteri**, *Phillips* [Proteaceae-Proteeae]; *S. salsoloidi*, R. Br., affinis, foliis brevioribus differt.

Rami glabri. *Folia* 0·6–1 cm. longa, linearia, apice obtusa, obtuse apiculata, paullo apice incurva, infra convexa, supra plana vel convexa, minute punctata, glabra. *Capitula* 4-flora, in racemis terminalibus 0·8–1 cm. longis circiter 1·2 cm. latis. *Bracteae* 5 mm. longae, 2 mm. latae, ovatae, apice acutae, aliquando bifidae, basi attenuatae, 14–16-nerviae, pilosae, ciliatae. *Pedunculus* 2 mm. longus. *Involucri bracteae* 4–4·5 mm. longae, ovatae, apice acutae, circiter 5-nerviae, pilosae, dense ciliatae. *Calycis tubus* 2·5 mm. longus, cylindricus, basi ventricosus, glaber vel minute pubescens; lobi 4–5 mm. longi, spathulato-lineares, inferne glabri, superne aliquando pilosi vel villosi, parte apicali dilatata 1 mm. longa elliptica subacuta glabra vel pilosa barbigera. *Stamina* 0·75–1 mm. longa; antherae ellipticae. *Ovarium* 0·5–0·6 mm. longum, ovatum, rostratum, villosum; stylus 5·5–6 mm. longus, teres, filiformis, supra ovarium articulatus, glaber; stigma 0·4 mm. longum, ellipticum, apice subacutum.

South Africa. Ceres Div.: Gydouwberg, *Schlechter*, 10,230.

1188. **Sorocephalus teretifolius**, *Phillips* [Proteaceae-Proteeae]; verisimiliter *S. spatalloidi*, R. Br., affinis, foliis levibus non asperis differt.

Rami minute tomentosi. *Folia* 1–1·4 cm. longa, cylindrica, obtuse apiculata, supra unisulcata, juniora dense pilosa, demum glabra. *Capitula* in spicis subsessilibus terminalibus 1 cm. longis circiter 1·2 cm. latis. *Involucri bracteae* 6–8 mm. longae, lanceolatae, apice acutae, concavae, pilosae, dense ciliatae. *Calycis tubus* 2–2·5 mm. longus, superne pilosus, inferne glaber; lobi 6·5 mm. longi, spathulato-lineares, paullo villosi, spiraliter contorti, parte apicali dilatata 1·3 mm. longa ovata vel elliptico-ovata subobtusa pilosa vel villosa barbigera. *Stamina* 0·6 mm. longa; antherae oblongo-lineares. *Ovarium* 1–1·5 mm. longum, ellipticum, rostratum, pilosum; stylus 7·5 mm. longus, teres, apice angustatus, supra ovarium constrictus, glaber; stigma 0·3–0·5 mm. longum, ellipticum vel ovatum, apice obtusum. *S. lanatus*, R. Br., var *teretifolius*, Meisn. in DC. Prodr. vol. xiv. p. 305.

South Africa. Worcester Div.: Dutoit's Kloof, *Drège*.

1189. **Sorocephalus rupestris**, *Phillips* [Proteaceae - Proteeae]; *S. teretifolio*, Phillips, affinis, bracteis villosis et fructibus brevioribus differt.

Rami cicatricosi, villosi, demum glabri. *Folia* 0·8–1·4 cm. longa, cylindrica, apice subacuta, apiculata, supra sulcata, basi plana, glabra. *Capitula* uniflora, in spicis terminalibus solitariis densis 0·8–1·2 cm. longis circiter 8 mm. latis. *Bracteae* 3·5 mm. longae, lanceolatae, apice subacutae, glabrae. *Involucri bracteae* 4–5 mm. longae, lanceolatae, subacuminatae, apice subacutae, dense villosae. *Calycis tubus* 2 mm. longus, cylindricus, glaber; lobi 7·8–8 mm. longi, spathulato-lineares, villosi, parte apicali dilatata 1 mm. longa ovata obtusa dense villosa breviter barbigera. *Stamina* sessilia, 1 mm. longa; antherae ellipticae vel elliptico-ovatae. *Ovarium* 1 mm. longum, ellipticum, pubescens, breviter rostratum; stylus 6–9·5 mm. longus, teres, e basi ad apicem sensim angustatus, supra ovarium constrictus; stigma 0·33 mm. longum, ovato-conicum, apice subacutum. *Fructus* 3 mm. longus, ovatus, apice obtusus.—*Soranthe montana*, Knight, Prot. p. 73; *S. rupestris*, Knight, l.c.

South Africa. Caledon Div.: mouth of the Klein River, *Niven*; Stellenbosch Div.: tops of Stellenbosch Mts., *Niven*, 28.

The parts of the flower in the Klein River specimen are larger than in Niven 28, but the material is too scanty to keep them specifically distinct as Knight did, especially as the two agree in vegetative characters.

1190. **Sorocephalus tulbaghensis**, *Phillips* [Proteaceae-Proteeae]; *S. phylicoidi*, Meisn., affinis, foliis levibus non asperis differt.

Frutex parvus, 23 cm. altus. *Rami* pilosi, demum glabri. *Folia* 0·6–1·2 cm. longa, linearia, obtuse mucronata, supra concava, infra convexa, sparse pilosa. *Capitula* 4-flora, in racemis terminalibus solitariis vel geminatis 1·2–1·8 cm. longis circiter 1·2 cm. latis. *Bracteae* 3·5–5·5 mm. longae, 1–1·5 mm. latae, ovatae, vel lineari-lanceolatae, apice subacutae, 4–7-nerviae, pilosae, ciliatae. *Pedunculus* 2 mm. longus, pilosus. *Involucri bracteae* 3–3·5 mm. longae, 1·5 mm. latae, ovatae, apice acutae vel subobtusae, 7–9-nerviae, pilosae, longe ciliatae. *Calycis tubus* 2 mm. longus, cylindricus, pubescens vel glaber; lobi 4·5 mm. longi, spathulato-lineares,

villosi, parte apicali dilatata 1·33 mm. longa elliptica vel ovata subobtusa villosa longe barbigera. *Stamina* 1 mm. longa : antherae ellipticae, apice glandulis minutis lanceolatis instructae. *Squamae hypogynae* 2 mm. longae, lineares, acuminatae. *Ovarium* 0·6–1·5 mm. longum, ovoideum, villosum, apice rostratum ; stylus 4·5–5 mm. longus, teres, supra ovarium articulatus ; stigma 0·33 mm. longum, conicum, apice obtusum.

South Africa. Tulbagh Div. : Tulbagh, *Pappe*.

1191. **Loranthus (Sycophila) Wildemanii**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 273, anglice [Loranthaceae-Euloranthеae] ; affinis *L. combretoidi*, Engl., a quo foliis pro rata angustioribus, petalis subduplo longioribus recedit.

Ramuli juniores purpureo-brunnei, subtiliter dense lenticellati, glabri. *Folia* opposita, oblanceolato-oblonga, apice obtuse acuminata, obtusa vel rotundata, basi subcuneata, 6·5–9·5 cm. longa, 2–2·7 cm. lata, chartacea vel tenuiter coriacea, glabra, opaca, nervis utrinque sat prominentibus ; petioli 6–7 mm. longi. *Racemi* foliis breviores vel longiores, 5–11·5 cm. longi : bractea late ovata, obtusa, 0·8 mm. longa. *Torus* 3 mm. longus. *Calyx* patens. *Corolla* in alabastro gracillima, inferne anguste quadrialata, alis apice subtruncatis ; petala 2 cm. longa, parte inferiore anguste oblonga 4 mm. longa 1–1·3 mm. lata extus costata intus minute papillata, parte superiore subulato-lineari 15 mm. longa reflexa. *Stamina* 1·5 cm. longa ; filamenta 5 mm. longa, fere glabra ; antherae 9 mm. longae, connectivo ultra thecas 0·8 mm. producto, locellis circiter 27 in utraque serie. *Stylus* 7 mm. longus.

Tropical Africa. Congo State : Sanda District ; near Oddu, *Gillet*, 3585.

1192. **Loranthus (Sycophila) sublilacinus**, *Sprague*, in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 275, anglice [Loranthaceae-Euloranthеae] ; affinis *L. Mannii*, Oliv., a quo foliis chartaceis vel tenuiter coriaceis, nervis lateralibus utrinque prominulis, petalis minoribus recedit.

Ramuli juniores purpureo-brunnei, plus minusve lenticellati, glabri, circiter 2 mm diametro 30 cm. infra apicem. *Folia* opposita, anguste lanceolato-, oblanceolato- vel elliptico-oblonga, apice obtusa vel rotundata, basi obtusa vel anguste cuneata, 4–7·5 cm. longa, 7–25 mm. lata, chartacea vel tenuiter coriacea, glabra, opaca, nervo medio sat prominente praesertim in facie inferiore, nervis lateralibus utrinque prominulis ; petioli 6–8 mm. longi. *Racemi* foliis breviores vel subaequales, circiter 7 cm. longi ; pedicelli circiter 1·5 mm. longi ; bractea late ovata, plus minusve truncata, circiter 1 mm. longa. *Torus* 3 mm. longus. *Calyx* erectus. *Corolla* in alabastro crassiuscula, inferne acute quadrangularis ; petala pallide lilacina, 6·5 mm. longa, parte inferiore oblonga 2 mm. longa 1·3 mm. lata haud manifeste costata intus minute papillata, parte superiore lineari-subulata 4·5 mm. longa. *Stamina* circiter 3·3 mm. longa ; filamenta 1 mm. longa, intus minutissime papillata ; antherae 2·3 mm. longae. *Stylus* 4·5 mm. longus ——*L. rosaceus*, Engl. in Engl. Jahrb. vol. xl. p. 521, quoad *Staudt*, 757.

Tropical Africa. Cameroons : Johann - Albrechtshöhe, *Staudt*, 757 ; Bipinde, *Zenker*, 2518.

1193. **Loranthus (Acrostachys) Thomsonii**, *Sprague*, in Dyer, Fl Trop. Afr. vol. vi. sect. 1, p. 276, anglice [Loranthaceae-Euloranthеae]; species racemis secundifloris insignis.

Folia sessilia, spathulata, 5 mm. longa, 1·5 mm. lata, coriacea, glabra, circa basin pedunculi fasciculata. *Racemi* 3–5 cm. longi, secundiflori, circiter 20-flori; pedunculus 1–1·2 cm. longus; pedicelli 0·5–0·8 mm. longi; bractea valde concava, ovata, obtusa, 1 mm. longa, ciliata. *Torus* campanulatus, 1·3–1·5 mm. longus. *Calyx* truncatus, vix 0·2 mm. longus. *Corolla* in alabastro linearis, obtusa, quadrangularis, superne leviter ampliata; petala linearia, circiter 2·3 cm. longa, juxta medium torta, inter basin et insertionem staminum 1 mm. lata, haud plicata, medio 0·5 mm. lata, superne 0·8 mm. lata. *Stamina* 2–2·5 mm. supra basin petalorum inserta, circiter 1·8 .cm. longa; filamenta inferne 0·5 mm. incrassata et adnata; antherae lineares, 2·5 mm. longae. *Discus* vix 0·3 mm. longus. *Stylus* fere 2·5 cm. longus; stigma ellipsoideum, 0·3–0·5 mm. longum.

Tropical Africa. Somaliland: Haudh, on *Balsamodendron* sp., *Thomson*, 23.

1194. **Loranthus (Plicopetalus) sagittifolius**, *Sprague*, in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 278, anglice [Loranthaceae-Euloranthеae]; affinis *L. undulato*, E. Mey., a quo umbellis 3–5-floris, toro breviore, stylo inferne recto recedit.

Ramuli patentes, graciles, lenticellati, glabri. *Folia* opposita, sessilia, alia elliptica, obovato-elliptica vel elliptico-oblonga, apice rotundata, basi obtusa, rotundata vel subcordata, 1·2–4·5 cm. longa, 0·8–3 cm. lata, tenuiter coriacea, glabra, 3–5-nervia, nervis valde obliquis prominulis, alia ovato-oblonga vel anguste oblonga, apice obtusa vel rotundata, basi sagittata, 1·2–3·5 cm. longa, 6–8 mm. lata. *Umbellae* solitariae, 3–5-florae, basi saepius foliatae; pedunculus 0·5–1 cm. longus; pedicelli graciles, 0·5–0·8 cm. longi; bractea patelliformis lobo dorsali breviter ovato, valde acute umbonata, umbone 0·5–0·8 mm. longo, margine dorsali 1 mm. longo, ventrali 0·25 mm. longo. *Torus* cupularis, 3–3·5 mm. longus. *Calyx* patulus, 1·3 mm. longus. *Petala* circiter 4·5 cm. longa, subacuta, superne oblanceolato-linearia, 1·3–1·5 mm. lata, medio 1 mm. lata, ab 4 mm. infra insertionem filamentorum deorsum valde ampliata, circiter 3 mm. lata juxta basin, paribus 4–5 plicarum obliquarum ex parte adnata filamenti ortarum. *Filamenta* 0·7–1·5 cm. supra basin petalorum inserta, 1·8–2 cm. longa, applanata, sursum leviter angustata; antherae lineares, 9–10 mm. longae, deorsum leviter angustatae. *Stylus* inferne rectus; stigma capitatum, 0·8 mm. diametro.——*L. undulatus*, var. *sagittaefolius*, Engl. Pflanzenw. Ost-Afr. vol. C., p. 167, t. 18, ff. A—C; Engl. in Engl. Jahrb. vol. xxx., p. 304.

Tropical Africa. British East Africa: in the coast districts, *Battiscombe*, 162; Kibwezi, on Leguminosae, *Scheffler*, 338; Kapte Plains, *Gregory*; Goudeona, on the Umba River, *Kässner*, 116. German East Africa: Usambara; Gombelo, *Holst*, 2173; Masheua, *Holst*, 8835; Muoa, *Holst*, 3103; Kilimanjaro Region, Lake Jalla, *Volkens*, 337; Usafua, lower slopes of Poroto Mountain, 1700 m., on *Acacia* sp., *Goetze*, 1038.

1195. **Loranthus (Rufescentes) leonensis**, *Sprague*, in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 282, anglice [Loranthaceae-Eulorantheae]; affinis *L. nigritano*, Hook. f., a quo floribus breviter pedicellatis, bractea calycem haud aequante recedit.

Ramuli juniores pilis multiramosis ferrugineo-tomentosi vel pubescentes, seniores glabri. *Folia* oblongo-lanceolata vel elliptico-oblonga, breviter obtuse acuminata, basi rotundata, 4–11·5 cm. longa, 2–4·5 cm. lata, coriacea, supra opaca, statu juvenili excepto glabra, subtus ferrugineo-tomentosa vel pubescentia; petioli 2–8 mm. longi. *Fasciculi* densi, multiflori, ferrugineo-tomentosi; pedicelli 1·5 mm. longi; bractea deltoideo-ovata, circiter 2 mm. longa, intus glabra. *Torus* 1·3–1·8 mm. longus. *Calyx* 0·8–1·3 mm. longus, pilis 0·5 mm. longis ciliatus. *Corolla* 3·8 cm. longa, extus pilis patentibus verticillatim ramosis ferrugineo-tomentosa; tubus intus minute glandulosus, ampulla basali 3 mm. longa 2 mm. diametro; lobi patuli vel patentes, spathulato-lineares, circiter 11 mm. longi. *Filamenta* circiter 2 mm. supra basin corollae loborum inserta, sursum sensim angustata, 5–5·5 mm. longa, basi 0·5 mm. lata, superne 1–1·5 mm. connata, glabra; antherae lineares, 2–2·5 mm. longae; locelli 6–7 in quaqua serie verticali. *Discus* pilis erectis rigidis 0·5–0·8 mm. longis dense ferrugineo-pilosus. *Stylus* glaber, superne metuliformis, collo 2–2·3 mm. longo; stigma ellipsoideum, 0·5 mm. longum.

Tropical Africa. Sierra Leone: Bagroo River, *Mann*; Oldfield's Farm, on *Psidium pyriferum*, Linn., *Barter*; Wallia, Scarcies Valley, *Scott-Elliot*, 4578; Talla Hills, near Lumbaraya, *Scott-Elliott*, 4997; Falaba, by Dantilia River, *Scott-Elliot*, 5294; near Kabusa (Limba), *Scott-Elliot*, 5472.

1196. **Erythrococca olacifolia**, *Prain* [Euphorbiaceae-Crotoneae]; species *E. miti*, Pax, et *E. rigidifoliae*, Pax, quam maxime affinis, ab ambabus tamen ovario dense adpresse strigoso facillime distinguenda.

Frutex, ramulis glabris, cortice pallido lenticellato; gemmae perulatae, squamis persistentibus. *Folia* petiolata, membranacea, ovato-lanceolata, obtusa, basi late cuneata, margine regulariter crenata, 6·5–8 cm. longa, 2·5–4 cm. lata, saturate viridia, glabra, nervi laterales utrinsecus subtus elevati: petiolus parce pubescens, supra cananiculatus, 0·8–1·2 cm. longus; stipulae cartilagineae, persistentes, in mammillas vel spinas perbreves mutatae. *Flores* minuti, in glomerulos axillares breve pedunculatos aggregati; pedunculi graciles, parce pubescentes, 4 mm. longi, feminei subglabri 6 mm. longi; pedicelli prope basin articulati, masculi glabri, capillares, 8 mm. longi, feminei rigiduli 3 mm. longi. *Calyx masculus* viridis, glaber; lobi 3, tenue membranacei, fere ad basin usque partiti. *Stamina* plerumque 12, exteriora 8, cetera centralia; filamenta loculos antherarum subglobosos excedentia; glandulae receptaculares minutae, glabrae, 5 exteriores ovatae, subcompressae, liberae, in annulum stamina cingentem dispositae, ceterae rhomboideae, juxtastaminales, filamentis seriei staminum exterioris basi 2-glandulosis. *Calyx femineus* quam calyce maris minor; lobi 3, margine minute ciliati. *Ovarium* dense adpresse strigosum, 3-loculare; styli 3, liberi, a basi fimbriato-laciniati. *Discus* e squamis 3 liberis lineari-ovatis ovarii

loculis alternantibus ovarioque aequilongis compositus. *Capsula* saepissime abortu 1–2-cocca, viridis, parce setosa. *Semina* rubescentes ; testa minutissime reticulata.

Tropical Africa. Nile Land : Uganda ; Toro, Bukarungu, 884 m., *Bagshawe*, 1191.

1197. **Erythrococca usambarica**, *Prain* [Euphorbiaceae-Crotoneae] ; affinis *E. abyssinicae*, Pax, sed foliis minus rigidis stipulis rarissime spinulosis racemis masculis brevioribus pedunculo hirsutis, pedicellis masculis brevioribus glandulisque receptaculi haud piligeris facillime sejungenda.

Frutex 1–3-metralis, ramulis gracilibus glabris, basi annulo perularum cinctis, cortice cinereo lenticellato. *Folia* breviter petiolata, ovato-lanceolata, in apicem obtuse acuminatum attenuata, basi late cuneata vel rotundata, margine distanter glanduloso-crenato-dentata, membranacea, 3·5–5 cm. longa, 2–2·5 cm. lata, supra laete viridia, subtus pallidiora, utrinque glabra ; nervi utrinsecus 3–4, adscendentes, indistincti ; petiolus parce puberulus vel glaber supra canaliculatus, 3–4 mm. longus ; stipulae rarissime in aculeas conicas 2 mm. longas fragiles mutatae. *Flores* minuti, racemosi, racemis masculis axillaribus pedunculo gracili parce puberulo 1–1·25 cm. longo, pedicellis capillaribus glabris prope basin articulatis 2 mm. longis, bracteolis ovatis minutis saepe plurifloris. *Calyx* viridis, membranaceus, glaber, in alabastro subsphaerico minute apiculato clausus dein profunde valvatim 4-(rarissime 5-) partitus, lobis ovatis acutis. *Stamina* 6–7, exteriora 5, cetera centralia glandulis juxtastaminalibus rhomboideis glabris intermixta glandulisque extrastaminalibus 5 glabris subbilobis circumcincta ; filamenta antheris obovoideis longiora. *Flores* foeminei adhuc ignoti. *Fructus* 2-coccus, didymus vel abortu 1-coccus, glaber, 6 mm. latus ; styli a basi fimbriati ; glandulae hypogynae 2 ; cocci loculicide dehiscentes. *Semina* sphaerica, testa reticulata.

Tropical Africa. Mozamb. Dist. : German East Africa ; Usambara, Derema, *Scheffler*, 160 ; near Amani, 915 m., *Engler*, 708 ; Handei, Nquelo, 900 m., *Heinsen*, 74.

Very nearly allied to *E.* (*Deflersia*) *abyssinica*, Pax, but the facies of the plant, owing to the smaller size and thinner texture of the leaves, is quite different and very distinctive.

1198. **Erythrococca zambesiaca**, *Prain* [Euphorbiaceae-Crotoneae]; species *E. natalensi*, Prain, et *E. berberideae*, Prain, proxima, ab ambabus tamen floribus minutis facile distinguenda ; ab hac etiam differt foliis valde tenuioribus, ab illa staminibus paucioribus.

Frutex, ramulis parce adpresse pubescentibus, cortice pallido lenticellato ; genmae perulatae squamis persistentibus. *Folia* breve petiolata, membranacea, ovata, obtusa vel subacuta, basi cuneata, margine obscure crenulata, 2–2·5 cm. longa, 0·8–1 cm. lata, pallide viridia, pilis perpaucis adpressis secus nervos subtus exceptis glabra ; nervi laterales utrinsecus 2–3, adscendentes ; petiolus parce adpresse pubescens, supra canaliculatus, 4 mm, longus ; stipulae cartilagineae, persistentes, in aculeos basi crassos apice pungentes mutatae. *Flores* minuti in racemos axillares dispositi ;

pedunculi gracillimi 4–6 mm. longi et rhachides pedunculis brevioribus adpresse pubescentes ; pedicelli masculi capillares, glabri, 5 mm. longi, prope basin articulati. *Calyx masculus* viridis, glaber, in alabastro depresso-globosus minute apiculatus ; lobi saepius 4, nonnunquam 5, casu 3, fere ad basin usque partiti. *Stamina* nunc 15, nunc 18, exteriora 9, cetera centralia ; filamenta antherarum loculos subglobosos excedentia ; glandulae complanatae, ambitu ovatae, albo-ciliatae ; exteriores 6 in urceolum lobatum extrastaminalem connatae, ceterae juxtastaminales. *Flores feminei* et fructus ignoti.

Tropical Africa. Mozamb. Dist.: Nyassaland ; Chiromo, *Scott Elliot*, 2795.

A very distinct species, in foliage and armature most resembling *E. natalensis*, with which it also agrees in the shape and arrangement of the receptacular glands, but from which it is readily distinguished by its minute green flowers with fewer stamens, and by its smaller leaves.

1199. **Erythrococca natalensis**, *Prain* [Euphorbiaceae-Crotoneae] ; affinis *E. aculeatae*, Benth., sed floribus majoribus racemis laxifloris, calyce maris semper 4-partito, pedicellis prope basin articulatis, staminibus numerosioribus glandulas receptaculi manifeste excedentibus glandulisque extrastaminalibus et staminibus seriei extimae 10 nec 5 differt.

Frutex, ramulis gracilibus junioribus parce pubescentibus cito glabris, basi annulo perularum deciduarum cinctis, cortice pallido lenticellato. *Folia* breviter petiolata, ovato-lanceolata, acuta vel obtusa, basi angustata, margine distanter glanduloso-crenato-dentata, tenuiter membranacea, 2·5–4 cm. longa, 1·25–2 cm. lata, laete viridia, opaca, utrinque glabra ; nervi utrinsecus 2–3, adscendentes, indistincti ; petiolus glaber, supra canaliculatus, 2–3 mm. longus ; stipulae in aculeos conicos pungentes 2 mm. longos mutatae. *Flores* parvuli, racemosi, racemis masculis axillaribus pedunculo gracili glabro 1–2 cm. longo paucifloro, pedicellis capillaribus glabris supra basin articulatis 3–5 mm. longis, bracteolis ovatis acutis minimis saepissime 2–3-floris vel nonnunquam 1-floris. *Calyx* albidus, tenuiter membranaceus, in alabastro subsphaerico minute apiculato clausus dein profunde valvatim 4-partitus, lobis ovatis acutis. *Stamina* circiter 30, exteriora 10, cetera centralia, glandulis juxtastaminalibus ovatis piligeris intermixta glandulisque extrastaminalibus 10 piligeris annulatim circumcincta ; filamenta antherarum locellis subglobosis longiora. *Flores feminei* adhuc ignoti.

South Africa. Natal : Inanda, Mt. Edgecumbe, *Wood*, 1089 ; Mt. Moreland, 150 m., *Wood*, 1391 ; without precise locality, *Gerrard*, 81.

The only other species of this genus hitherto known with deciduous bud-scales and much enlarged stipular spines is *E. aculeata*, Benth., on which the genus was founded, but the plant here described is very distinct from *E. aculeata* on account of its larger flowers with more numerous stamens and relatively smaller receptacular glands.

1200. **Erythrococca berberidea**, *Prain* [Euphorbiaceae-Crotoneae]; species *E. natalensi*, Prain, quam maxime affinis sed foliis rigidioribus acutatis floribusque minoribus staminibusque paucioribus apte distinguenda.

Frutex, ramulis glabris, cortice pallido lenticellato; gemmae perulatae. *Folia* breve petiolata, chartacea, ovato-lanceolata vel ovata, apice acuta, basi nunc late nunc anguste cuneata, margine regulariter et distincte serrata, 4–6 cm. longa, 1·5–2 cm. lata, intense viridia, supra glabra, subtus glabra vel pilis perpaucis adpressis secus nervos obsita, nervi laterales utrinsecus 2 vel 3, adscendentes, praeter imos subbasales elongatos valde obscuri; petioli prope insertionem parce adpresse pubescentes ceterum glabri, supra canaliculati, 3 mm. longi; stipulae cartilagineae, persistentes, in aculeos 2–3 mm. longos saepissime mutatae. *Flores* parvuli in racemos paucifloros axillares dispositi; pedunculi glabri 4 mm. longi et rhachides glabrae 1 cm. longae, floribus ad nodos 1–2 mm. distantes masculis glomeratis femineis singulis; pedicelli glabri, masculi capillares, 1 cm. longi, 1–2 mm. supra basin articulati, feminei 6 mm. longi, crassiores. *Calyx masculus* albidus, glaber; alabastra globosa minute apiculata; lobi 4, fere ad basin usque partiti. *Stamina* 15–18, 8–10 exteriora, cetera centralia; filamenta antherarum loculos subglobosos excedentia, glandulis 5 complanatis extrastaminalibus margine ciliatis circumcincta et aliis late complanatis apice hirsutis intermixta. *Calyx femineus* viridis, 3-lobus, lobis ovatis subacutis margine ciliatis. *Ovarium* glabrum, 3-loculare; styli 3, liberi, a basi fimbriati. *Discus* e squamis 3 liberis triangularibus submembranaceis calyce brevioribus ovarii loculis alternantibus compositus. *Capsula* saepius abortu 2-cocca vel monococca, 8 mm. lata. *Semina* fere sphaerica.

South Africa. Natal: near Durban, 60 m., *Medley Wood*, 7582.

Very nearly allied to the other Natal species and like it somewhat closely allied to the original *E. aculeata* from Sierra Leone, as well as to *E. zambesiaca* from Chiromo.

1201. **Erythrococca Ledermanniana**, *Prain* [Euphorbiaceae-Crotoneae]; affinis *E. hirtae*, Pax, sed foliis minoribus fere glabris, staminibus numerosioribus filamentisque longioribus facillime distinguenda.

Frutex vel *arbuscula* 2–5-metralis, ramulis gracilibus parce pubescentibus, basi annulo perularum persistentium cinctis, cortice pallido lenticellato. *Folia* breve petiolata, ovata, acuta, basi late cuneata, margine indistincte dentata, 4–5 cm. longa, 2–2·5 cm. lata, pallide viridia, pilis perpaucis secus nervos exceptis utrinque glabra et minute verruculosa; petiolus parce pubescens, supra canaliculatus, 6 mm. longus; stipulae cartilagineae, induratae, nonnunquam in mammillas latiusculas mutatae. *Flores* perparvi, racemosi, racemis masculis axillaribus, pedunculo gracili parce hispidulo 5 mm. longo; pedicellis capillaribus glabris 3–4 mm. longis prope basin articulatis; bracteolis parvis. *Calyx maris* viridis, glaber vel apice parce pubescens, in alabastro globoso minute apiculato clausus dein profunde valvatim 3-partitus, lobis triangulari-ovatis. *Stamina* 27, exteriora 10, cetera centralia,

glandulis juxtastaminalibus rhomboideis apice hirsutis intermixta; filamenta antherarum locellis triplo longiora. *Flores feminei* adhuc ignoti.

Tropical Africa. Upper Guinea: Cameroons; Esole, on Mt. Basso, 1860 m., *Ledermann*, 2032; Mfongu, slopes of Muti, 1700–1920 m., *Ledermann*, 5877.

Nearly allied to *E. hirta*, Pax, which in turn is very closely related to *E. trichogyne* (Claoxylon trichogyne, *Muell.-Arg.*), and to *E. Mildbraedii* (C. Mildbraedii, *Pax*). These four species appear to constitute a very definite natural group. The male flowers of *E. trichogyne* are unknown but those of the other two species are readily distinguished from the male flowers of *E. Ledermanniana* by having fewer stamens.

1202. **Claoxylon (Athroandra) patulum**, *Prain* [Euphorbiaceae-Crotoneae]; affinis *C. Mannii*, Hook. f., sed foliis majoribus pallidioribus hispidis nervis numerosioribus petiolisque brevioribus, staminibus numerosioribus facillime distinguenda.

Arbuscula vel *frutex*, ramulis gracilibus hispidis, basi annulo perularum persistentium cinctis, cortice fusco hispido lenticellato. *Folia* breve petiolata, ovata vel anguste elliptica, abrupte acuminata acumine ad 2·5 cm. usque longo, basi rotundata, margine minute et distanter sed distincte glanduloso-dentata, tenuiter membranacea, 20–25 cm. longa, 6–8 cm. lata, pallide viridia, pilis patentibus praesertim secus nervos utrinque hispida, vel nonnunquam pilis patentibus perpaucis secus nervos faciei inferioris exceptis glabra, subtus minute verruculosa; nervi utrinsecus 8–10, primum subpatentes dein adscendentes, intra marginem anastomosantes; petiolus 6–8 mm. longus, pilis patentibus hispidus. *Flores* parvi, racemosi, racemis axillaribus pedunculo maris glabro gracillimo rigidulo 3–5 cm. longo, pedicellis maris capillaribus glabris prope basin articulatis 1·2–3 cm. longis, bracteolis membranaceis lanceolatis 1·5 mm. longis plurifloris. *Calyx maris* pallide viridis, membranaceus, glaber, in alabastro pyramidali-conico clausus dein profunde valvatim 4-lobus, lobis anguste triangularibus apice acuminato incrassatis. *Stamina* alba, 50–54, exteriora 10, cetera centralia, glandulis juxtastaminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Flores feminei* et fructus adhuc ignoti.

Tropical Africa. Upper Guinea: Cameroons; Jabassi, 60–100 m., *Ledermann*, 1063, 1106.

Most nearly related to *C.* (*Athroandra*) *Mannii*, Hook. f., with which it agrees in having pyramidal-conic not subglobose buds, but from which it differs in having much paler leaves more or less hispidly hairy, with twice as many nerves.

1203. **Claoxylon (Athroandra) Poggei**, *Prain* [Euphorbiaceae-Crotoneae]; species *C. columnari*, Muell.-Arg., similior eoque quoad antherarum numerum congruens, differt tamen indumento pilorum patentium composito et praecipue bracteolis longioribus linearibus subulatis.

Frutex, ramulis gracilibus pilis patentibus pubescentibus, basi annulo perularum persistentium cinctis, cortice viridescente lenticellato. *Folia* distincte petiolata, anguste ovata, acute

acuminata, basi cuneata, margine irregulariter breve sed densius crenato-dentata, membranacea, 5–6 cm. longa, 2·5 cm. lata, supra saturate viridia, subtus pallidiora, utrinque sed praesertim subtus et secus nervos pilis patentibus hispidula; nervi utrinsecus 3–4, graciles, adscendentes, intra marginem anastomosantes; petiolus 6 mm. longus, pilis patentibus hispidulus. *Flores* parvi, racemosi, racemis axillaribus pedunculo maris gracile hispidulo 2·5–3 cm. longo, pedicellis maris capillaribus glabris prope basin articulatis 6 mm. longis; bracteolis herbaceis subulatis 2 mm. longis plurifloris. *Calyx maris* viridis, membranaceus, glaber, in alabastro e basi lata breviter conico clausus dein profunde valvatim 4-lobus, lobis late triangularibus apice acuminato incrassatis. *Stamina* ultra 60, exteriora 10, cetera centralia, glandulis juxtastaminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Flores feminei* et fructus adhuc ignoti. *C. columnare*, Engl. in Sitz. Preuss. Akad. Wiss. xxxviii. p. 829; nec Muell. Arg.

Tropical Africa. Congo State: Lualaba-Kasai Dist.; Mukenge, *Pogge*, 1373; Kwango Dist., *Butaye*; environs of Lazaret, *Vanderyst*.

1204. **Claoxylon (Athroandra) oleraceum**, *Prain* [Euphorbiaceae-Crotoneae]; affinis *C. atrovirenti*, Pax, sed foliis saturatius viridibus maturitate rigidioribus fere glabris nervis paucioribus magisque prominentibus, pedicellis brevioribus fructibusque minoribus satis distincta.

Frutex 1–3-metralis, ramulis gracilibus sparse puberulis, basi annulo perularum persistentium cinctis, cortice brunneo vel cinereo lenticellato. *Folia* distincte petiolata, ovata vel oblonga, acuminata, basi rotundata, margine minute glanduloso-dentata, matura rigidiuscula, 7–18 cm. longa, 4–8 cm. lata, supra saturate viridia, subtus pallidiora minutissime verruculosa, et parce persistenter pubescentia praesertim secus nervos; nervi utrinsecus 3–5, subpatentes, intra marginem distincte anastomosantes et maturitate distincte subtus elevati; petiolus parce adpresse pubescens, 0·8–1·2 cm. longus. *Flores* parvuli, racemosi, racemis axillaribus, pedunculo gracili parce pubescente maris ad 2·5 cm. usque longo, feminei 2 cm. longo, pedicellis capillaribus glabris prope basin articulatis, maris 0·8–1·2 cm., feminei 2 mm. tantum longis, bracteolis ovatis membranaceis parvis maris plurifloris, feminei 1-floris. *Calyx maris* albidus, membranaceus, glaber, in alabastro subsphaerico minute apiculato clausus dein profunde valvatim 4-lobus, lobis ovatis acutis. *Stamina* 30–40, exteriora 10, glandulis juxtastaminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Calyx feminei* 2-lobus, lobis ovatis acutis. *Discus* hypogynus distinctus, cupularis, altero latere margine integer sed inaequalis altero angustatus. *Ovarium* 2-loculare, glabrum; stylus crassus, perbrevis, stigmatibus 2 ovatis vel lineari-ovatis integris laevibus divaricatis coronatus. *Fructus* cinnabarinus, 2-coccus, didymus vel casu abortu 1-coccus, glaber, 6 mm. latus, stylo stigmatibusque nunc recurvis coronatus; cocci loculicide dehiscentes. *Semina* cinerea, fere sphaerica, manifeste reticulata.—*C. Barteri*, Hook. f., Journ. Linn. Soc. vi. p. 21, partim et quoads pp. Barteriana in insula Lagos lecta tantum. *C. africanum*, Muell.-Arg. in DC.

Prodr. xv. 2, p. 777 partim et quoad Barter n. 2223 tantum ; De Wild. et Dur. in Bull. Herb. Boiss. sér. 2, i. p. 47 et in Ann. Mus. Congo, Bot. sér. 3, ii. 209 ; De Wild. Miss. Laurent, i. p. 130 et in Ann. Mus. Congo, Bot. sér. 5, ii. p. 279 (spp. Sapiniana in regione Lualaba-Kasai excludenda) ; Rendle in Journ. Linn. Soc. Bot. xxxvii. p. 213 ; nec *Trewia ? africana*, Baill.

Tropical Africa. Upper Guinea : S. Nigeria ; Lagos Island, *Barter*, 2223. Cameroons ; Tchâpe Pass, 1500 m., *Ledermann*, 2845 ; Tibati, 890 m., *Ledermann*, 2433 ; Yaunde, 800 m., *Zenker and Staudt*, 211 ; *Zenker*, 184, 499, 712. Lower Guinea : Spanish Guinea ; Bebao, *Tessmann*, 555. Nile Land : Uganda ; coast of Lake Victoria Nyanza, 1220 m., *Bagshawe*, 588. Congo State : Stanley Pool Dist., Kisantu, *Gillet*, 37, 74, 1419, 1865 ; Kimuenza, *Gillet*, 2144 ; Lukolela, *Dewevre*, 748 ; Injolo, *Ledoux and Huyghe*, 22 ; Lulonga, *Pynaert*, 767 ; Eala, *Pynaert*, 525, 920 ; Bangala Dist., Bumba, *Laurent ;* Abumonbasi, *Thonner*, 200 ; Leopold II. Dist., near Lake Leopold II., *Body*, 92.

This is very closely related to *C. atrovirens*, Pax and more especially to the form of *C. atrovirens* which has been distinguished by Pax under the name *C. inaequilaterum*. As a rule the leaves differ markedly in shape and are much more sparingly pubescent but in some of the gatherings the leaves of the two much resemble each other. The female flowers of *C. atrovirens* and *C. oleraceum* are not distinguishable but the fruit of *C. oleraceum* is smaller and more deeply depressed between the cocci than is the case in *C. atrovirens* while the seeds in our plant are more deeply reticulated than those of its near ally. *C. Barteri* Hook. f. (*C. africanum*, Muell.-Arg.), to which this species has hitherto been referred, differs in having a much shorter style with subglobose and papillose stigmas and in having a shallow urceolate hypogynous disk, slightly 5-lobed in fruit. Its leaves also are smaller and are thinly membranous even when quite mature. We are indebted to the kindness of Dr. Engler and of Dr. De Wildeman for an opportunity of studying the extensive series of specimens of this species which are preserved in the Berlin and the Brussels herbaria. From the field notes accompanying many of the specimens collected in the Congo State it would appear that throughout the area in which it occurs the leaves of this plant are generally used as a vegetable. In monographing the genus *Claoxylon* it will be found desirable to transfer the section *Athroandra* to the allied genus *Erythrococca*, Benth.

1205. **Claoxylon (Athroandra) macrophyllum**, *Prain* [Euphorbiaceae-Crotoneae] ; species *C. hispido*, Pax, et *C. Dewevrei*, Pax, valde affinis ab ambobus tamen ramulis pedicellis petiolisque adpresse molliter pubescentibus nec patule hispidis, lamina basi angustiore, petiolisque longioribus differt.

Frutex, ramulis molliter adpresse pubescentibus ; gemmae perulatae squamis persistentibus. *Folia* petiolata, membranacea, obovato-lanceolata, apice acuminata, basi cuneata, margine subundulato crebre sed breviter crenata, 22·5–25 cm. longa 7–7·5 cm. lata, saturate viridia, subtus pallidiora, supra primum sparse pubescentia praesertim secus nervos, cito glabrescentia, subtus secus nervos nervulosque persistenter adpresse pubescentia ; nervi laterales

utrinsecus 5–6, adscendentes, intra marginem anastomosantes; petiolus sparse adpresse pubescens, supra canaliculatus, 1·25–2 cm. longus; stipulae minutae, subulatae. *Flores* parvi, in racemos axillares dispositi, masculi tantum noti; pedunculi pergraciles, adpresse sericei, 1·25–2 cm. longi; pedicelli glabri, capillares, 6–8 mm. longi, prope basin articulati. *Calyx masculus* viridis, glaber, in alabastro globosus minute apiculatus; lobi 4, fere ad basin usque partiti. *Stamina* 24, quorum exteriora 10, cetera centralia; antherarum loculi obovoidei filamenta excedentes; glandulae juxtastaminales rhomboideae apice pilis elongatis viscidis hirsutae. *Flores feminei* fructusque ignoti.

Tropical Africa. Congo State: Eastern Province; Fort Beni, Kwa Muera, *Mildbraed*, 2197.

Apparently very nearly allied to, and as regards its male flowers not distinguishable from *C. hispidum*, Pax, a species confined to the Cameroons, and to *C. Dewevrei*, Pax, which occurs both in the Cameroons and in the south-eastern portion of the Congo State. It differs, however, from both species in shape of leaf and in the absence of the spreading hispid hairs which occur on the petioles, peduncles and main nerves of the leaves in the two species mentioned. The section *Athroandra* is probably more satisfactorily referred to *Erythrococca* than to *Claoxylon*, on account of the character of its buds.

1206. **Urera Woodii**, *N. E. Brown* [Urticaceae-Urticeae]; similis *U. cameroonensi*, Wedd., sed foliis pro portione brevioribus et latioribus basi obtusioribus, cymis ramosioribus et floribus minoribus differt.

Frutex diffusus, ramis glabris inermibus. *Folia* alterna, coriacea, integra, basi trinervata, utrinque glabra vel pilis urentibus paucis subtus secus nervos et in apice petioli armata; petiolus 1·5–3 cm. longus; lamina 6–9 cm. longa, 3–6 cm. lata, late elliptica vel rotundato-ovata, apice cuspidato-acuminata, basi obtusa, late rotundata vel subcordata, exsiccata cystolithis minutis utrinque dense obtecta. *Stipulae* 5–10 mm. longae, attenuato-ovatae, acutae. *Cymae* masculae 4–7 cm. longae, 2·5–4 cm. latae, multiramosae. inermes; femineae 2·5–3·5 cm. longae, 3–5 cm. latae, ramosissimae, pilis urentibus armatae. *Flores* sessiles:—masculi calicis lobis 2 mm. longis ovato-oblongis apice subtruncatis minute denticulatis; feminei calyce tubuloso ovarium aequante apice 4-crenulato crenulis minutissime denticulatis. *Achaenium* fere 2 mm. longum, semiexsertum; stigma subsessile, capitatum, magnum, fulvum.

South Africa. Pondoland; in a cutting to the lighthouse near Port St. John, *Miss A. Pegler*, 1533. Natal; near Umzinyati Falls, *Wood*, 1803, and without precise locality, *Sanderson*, 594.

1207. **Sansevieria gracilis**, *N. E. Brown* [Liliaceae-Dracaeneae]; species suffruticosa, ramosa, foliis teretibus et perianthio basi minute tuberculato distinctissima.

Suffruticosa, breviter caulescens, ramosa; rami 15–20 cm. longi, 6 mm. crassi, apice foliosi. *Folia* 22-60 cm. longa, 6–11 mm. crassa, teretia, basi brevissime vaginata, apice spinoso-acutissima, obscure viridia, atroviridi-lineata, juniora inconspicue zonata, laevia. *Racemus* laxus, 6–7 cm. longus. *Pedicelli* 2–2·5 mm. longi, supra

medium articulati. *Perianthium* album ; tubus 2 cm. longus, gracilis, ad basin obconicam minute tuberculatus ; lobi 1 cm. longi, lineares, obtusi, revoluti.

TROPICAL AFRICA. British East Africa : Mazeras, common, *Powell*, 11.

1208. **Sansevieria Jacquinii**, *N. E. Brown* [Liliaceae-Dracaeneae]; affinis *S. guineensi*, Willd., sed foliis longioribus marginibus viridibus facile distinguitur. *Aletris guineensis*, Jacq., Hort. Vindobon. vol. 1, p. 36, t. 84.

Acaulis. *Folia* solitaria vel bina, 60–120 cm. longa, 4·2–7 cm. lata, anguste lanceolata, subulato-acuta, basi in petiolum longum attenuata, viridia, fasciis transversis dilutioribus variegata, marginibus viridibus. *Racemus* cum pedunculo ad 45 cm. longus. *Fasciculi* 3–6 flori. *Flores* subsessiles, albi ; tubus 25 mm. longus, lobi 22 mm. longi, lineares, obtusi.

Origin unknown, but probably a native of West Tropical Africa.

1209. **Sansevieria Pearsonii**, *N. E. Brown* [Liliaceae-Dracaeneae]; affinis *S. cylindricae*, Boj., sed foliis brevioribus distincte canaliculatis differt.

Acaulis. *Folia* disticha, erecta, rigida, 6·8–8·3 dm. longa, basi 3–4 cm. crassa, cylindrica, acuta, antice acute canaliculata, laevia. *Inflorescentiam* et flores non vidi. *Pedicelli* fasciculati, in fructu 9 mm. longi, infra medium articulati. *Baccae* aurantiacae.

TROPICAL AFRICA. South Angola : among rocks in open forest, near kilometre 108·5 on the Mossamedes Railway, 500 m., *Pearson*, 2073.

1210. **Sansevieria singularis**, *N. E. Brown* [Liliaceae-Dracaeneae]; species foliis solitariis validis longissimis cylindricis distinctissima.

Acaulis. *Folium* solitarium, erectum, 0·45–2·60 m. longum, basi 2–4·3 cm. crassum, cylindricum, acutum, demum 5–9-sulcatum, scabridulum, brunnescens vel griseo-virens, leviter subglaucescens, junioribus obscure zonatis. *Flores* ignoti.

TROPICAL AFRICA. Uganda : by the river, mile 150–200, *Tompson*. British East Africa : Voi, common, *Powell*, 2.

VII.—RUBBER CULTIVATION IN TOGOLAND AND GERMAN EAST AFRICA.

The following account of the cultivation of *Manihot Glaziovii*, and other rubber-producing plants in Togoland and German East Africa, has been translated from a paper entitled "Der Kautschuk in den deutschen Kolonien," by Prof. Warburg, published in L'Agronomie Tropicale, 1910, Nos. 7 and 8, pp. 190–192 and p. 235. The paper, of which the account reproduced forms a part, was presented at the International Congress for Tropical Agriculture held at Brussels last year.

It should be remembered in reading this note that *Kickxia elastica* is now more usually known under the name *Funtumia elastica*.

"**Togoland.**—The cultivation of rubber in Togo has hitherto been very insignificant. Rubber-growing has been taken up by only one of the two plantation-companies, viz., the Agu Planting Company, and about 140 hectares have been planted with *Manihot Glaziovii*, and 30 hectares with *Kickxia elastica*. The latter plant, however, does not thrive. It evidently suffers during drought, yields scarcely any latex, frequently dies off, and is being slowly replaced by *Manihot*. *Manihot Glaziovii* develops excellently, and the increase in production is large, the twenty oldest trees having yielded 160 grams on an average last year. Also the tapping is very simple, since the sap remains fluid (here but not in East Africa), and can therefore be collected in basins after the usual methods of cutting. The expense of tapping amounts to less than one mark per kilogram of dry rubber, and this is only a third of the cost for the same tree in East Africa. As there is no lack of cheap and good labour, the cultivation of this plant will presumably extend considerably here. *Ficus elastica* develops quite favourably on the Agu-plantation, but only $1\frac{1}{2}$ hectares are planted with it.

"**German East Africa** is the land of the cultivation of *Manihot Glaziovii*. This species was planted experimentally at Tanga and in Dar-es-Salaam in the years between 1890 and 1900, but for a long time there was no success in obtaining any production worth considering. The attempt was on the point of being given up, when at last in 1900 the planter Köhler succeeded in discovering a suitable method of tapping. This was on the Lewa plantation near Tonga. The Lewa-method, as it is called, is carried out in the following way: Portions of the cortex are cleaned by the removal of pieces of bark and are painted over with dilute acetic, citric, or carbolic acid, or latterly with fluoric acid (purub), and then almost point-like incisions are made. From these the latex flows out, and coagulates on the spot as thin tears of rubber. These are collected and worked up into round balls.

"Since the discovery of this method the cultivation of this easily grown tree has rapidly increased. At the beginning of 1902 there were about 300,000 trees already planted out, in April 1904 about half a million, in April 1905 nearly a million, and at the beginning of 1907 five millions. At the present time there should be at least eight million trees, corresponding to about 8000 hectares. About 1000 trees are planted to the hectare, but recently there is a tendency in favour of the view that wide planting is more correct, *e.g.* 4 × 4 meters, *i.e.* 625 trees to the hectare. To judge from experimental tappings the production is quite satisfactory. According to Prof. Zimmermann, one may count on 100 grm. of rubber in the third or fourth year, 125 in the fourth or fifth, 200 in the fifth or sixth, 300 in the sixth or seventh, 400 in the seventh or eighth, 500 in the eighth or ninth. Although individual trees have been known to give 5–6 kg. of rubber, it is probable, according to Geheimrat Stuhlmann, that the yield will not be more than 125 grm. per tree, if one takes the average of a large number, *i.e.*, 125 kg. per hectare, and in the third and fourth years one should reckon on only 25 kg. per hectare. With economical management the expense per kilogramme should amount to 2·80 marks for tapping, including the cost of recruiting and of building huts,

and the cost of coagulation. This is three times as high as for *Manihot* in Togo, and five times as high as for *Kickxia* in the Cameroons. It must also be taken into account that *Manihot*-rubber fetches a considerably lower price than *Kickxia*-rubber. Generally the labourer collects each day only 500 grm. of wet rubber, corresponding to 250 grm. of the dry product. Thus to obtain 125 kg. of dry rubber per hectare, 600 working days are necessary, and consequently, allowing for the rainy season, holidays, &c., about three labourers to the hectare are required. With the rapid increase in the cultivation of rubber, it must, however, be assumed that the available number of labourers will soon be insufficient. Even the 8000 hectares, which have now been planted, will require 24,000 labourers for the collection of all the rubber. On the other hand the method of tapping has recently been improved, nearly the whole of the outer cortex being now removed several times a year. With this improvement in method it is hoped that larger incisions can now be employed, and that 2 kg. of wet or 1 kg. of dry rubber per labourer per day may be obtained. Should this prove correct, the cost-price would be materially less, and also the number of labourers required would be reduced to one-fourth.

"The rubber not only includes all sorts of impurities, on account of its mode of preparation, but it also contains much more resin than the better kinds among other rubbers. It therefore only fetches a little more than half the price of Para-rubber, and is even 25–30 per cent. cheaper than good African liane-rubber. It was consequently difficult to find a market for it at times when rubber was abundant; but, with the high prices of the present day, it is now much in request. The export of plantation-rubber from East Africa is naturally only of very recent date. Lewa, the oldest plantation, exported $3\frac{1}{2}$ tons (Tonnen) in 1905, $7\frac{1}{2}$ in 1906, and $12\frac{1}{2}$ in 1907.

"In the year 1908, however, 87 tons of plantation-rubber, of the value of 416,000 marks were exported from East Africa, as against 124 tons of wild rubber having a value of 576,000 marks. When once the 8000 hectares are ready for the collection of rubber, 1000 tons may be expected from them, and the value of this would be 7–8 million marks. Thus even in the next few years plantation-rubber will have far outstripped wild rubber in East Africa, and will probably be the most important article of export of the country. Other species of the same genus, *Manihot dichotoma*, *M. heptaphylla* and *M. piauhyensis*, recently introduced from Brazil, have not yet passed their experimental stage.

"*Kickxia* has been planted in rather large numbers only in the Neulangenburg district, where there are about half a million trees, as well as 30,000 trees of *Castilloa* while in the principal region of rubber-plantations, in the Tanga district, only 10,000 *Castilloa* and 670 *Kickxia* were counted in the year 1908. Neither of these plants has any great future in German East Africa. There is a better future for *Hevea*, which thrives quite well in certain places on the damp alluvial soil of the rivers. Nevertheless, in consequence of two long periods of drought, the climatic conditions are not exactly favourable to its development. According to these results, obtained

especially in Sigital, one may advise, for those plantations on which irrigation is possible, that *Hevea* should be planted between the *Manihot*. If the experiment should succeed, the large gains from *Hevea*-rubber would more than compensate for the loss of the *Manihot*, which would probably be killed off by overshadowing.

"The plantations of rubber-lianes in the Neulangenburg district on Lake Nyassa are also interesting, and appear to be doing quite well. These lianes may be recommended for planting as a subsidiary culture. The species most generally planted here is *Landolphia Stolzii*, a robust liane, which develops well even on dry soil, and in ten years attains a height of 15–20 m. with a stem 20 cm. in circumference. According to Dr. Eduardoff one can now reckon on obtaining 75 grm. of good rubber by tapping once in zig-zag fashion, and this can be done once a month, periods of rest being naturally allowed. In this species young plants give bad rubber, and therefore tapping does not appear to be advisable before the seventh year. The cultivation of the shrubby *Landolphia dondeensis* has also been started, and is perhaps locally promising.

"All the other rubber-plants in East Africa are still in the experimental stage. Among these are *Cryptostegia grandiflora*, *Clitandra hilimandjarica*, *Mascarenhasia elastica*, which does not appear to thrive, and *Ficus Schlechteri*, a tree, which, after several years of cultivation, is only now beginning to increase its rate of growth."

VIII.—THE JAPANESE SPECIES OF CERASTIUM.

H. Takeda.

Historical.

Thunberg* was the first botanist to record the Japanese species of the present genus. He enumerates two species, viz. :—*C. vulgatum* and *C. viscosum*. According to Miquel† these two plants of Thunberg do not differ from each other but are *C. vulgatum*, Linn. *a brachypetalum lusus glandulosum*, Fenzl. In 1875 Franchet and Savatier‡ knew *C. glutinosum*, *C. viscosum*, *C. vulgatum* β *glandulosum*, and *C. alpinum* β *Fischerianum*. Meanwhile Maximowicz§ enumerated *C. semidecandrum*, Linn. var. *herbaceo-bracteatum*, Fenzl ; *C. vulgatum*, Linn. β *glandulosum*, Koch ; *C. vulgatum*, Linn. *lusus hirsutum*, Fenzl ; and *C. alpinum*, Linn. β *Fischerianum*, Regel, as natives of Japan. He suggested that the plant figured on fol. 30 of vol. viii. of Sômoku Dzusetsu under the name of "Ôyama-fusuma" seemed to be *C. arvense*, Linn., so that Japan would be added to localities of the plant. Franchet and Savatier in the second volume of their Enumeratio published in 1879 made some alterations and additions to their previous knowledge. They considered that the specimen, no. 137, collected by Savatier at Yokosuka and referred to in their work under *C. glutinosum* must be *C. vulgatum* var. *glandulosum*,

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* Thunberg, Flora Japon. p. 188 (1784).
† Miquel, Prolus. Fl. Japon. p. 10 (1866).
‡ Franchet et Savatier, Enum. Pl. Japon. i, p. 50 (1875).
§ Maximowicz, in Bull. Acad. Imp. St. Petersb. tom. xviii. pp. 385–386 (1873).

while, following Maximowicz, they added Nagasaki as the locality of *C. glutinosum*, Fries. They were in doubt as to the existence of *C. viscosum* in the Flora of Japan, since this species is not enumerated in Maximowicz's paper, and supposed their specimen might be a glandular form of *C. vulgatum*. They added to *C. vulgatum* another variety, var. *alpinum*, Koch, based on a specimen obtained from Mount Ibuki. Afterwards Maximowicz* published a new species of this genus, called *C. schizopetalum*, from Central Japan, which is very interesting and is distinguished by having regularly 4-lobed petals. In the Flora of the Kurile Islands published a few years later Professor Miyabe† enumerated three species with varieties, viz. :—*C. semidecandrum*, Linn. var. *herbaceo-bracteatum*, Fenzl ; *C. vulgatum*, Linn. var. *glandulosum*, Koch ; var. *grandiflorum*, Fenzl ; *C. alpinum*, Linn. var. *Beeringianum*, Regel ; var. *Fischerianum*, Torr. et Gray. Of these the author had seen the specimens of the second and the last plants ; others were inserted in his paper on the authority of the Russian botanists. In 1898 Williams‡ made a revision of the Japanese species. According to his opinion there are eight species known as Japanese, two of them being new :—*C. schizopetalum*, Maxim. ; *C. robustum*, Williams ; *C. alpinum* var. *Fischerianum*, Torr. et Gr. ; *C. pumilum*, Curtis ; *C. Ianthes*, Williams ; *C. arvense*, Linn. ; *C. triviale*, Link with two varieties namely *typicum*, Will. and *glandulosum*, Koch ; and *C. glomeratum*, Thuill. A few years ago another new species, *C. oxalidiflorum*, was added by Makino§ to the Japanese Flora. No specimen of this genus had been collected in the extreme South of Japan, until Dr. Hayata‖ reported the occurance of two species in the island of Formosa :—*C. pilosum*, Led. and *C. morrisonense*, Hayata.

From the results of the labours of these botanists we understand the following species to be reckoned as natives of Japan :—

1. *C. pilosum*, Ledeb.
2. *C. oxalidiflorum*, Makino.
3. *C. triviale*, Link.
   var. *typicum*, Williams,
   = *C. vulgatum lusus hirsutum*, Maxim.
   var. *glandulosum*, Koch.
   var. *alpinum*, Koch.
   var. *grandiflorum*, Fenzl.
4. *C. pumilum*, Curtis,
   = *C. glutinosum*, Fr. et Sav.
   = *C. semidecandrum*, var. *herbaceo-bracteatum*, Maxim.
5. *C. Ianthes*, Williams.
6. *C. glomeratum*, Thuill.,
   = *C. viscosum*, Fr. et Sav.
7. *C. alpinum*, Linn.
   var. *Beeringianum*, Regel.
   var. *Fischerianum*, Regel.

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* Maximowicz, in Bull. Acad. Imp. Sc. St. Peters. xxxii. p. 483 (1887).
† Miyabe, Fl. Kuril. in Mem. Boston Soc. Nat. Hist. iv. No. 7, p. 220 (1890).
‡ Williams, in Bull. Herb. Boiss. vii. pp. 129–32 (1899).
§ Makino, in Tôkyô Bot. Mag. xix. p. 102 (1905).
‖ Hayata, Fl. Mont. Formos. p. 57 (1908).

8. *C. robustum*, Williams.
9. *C. morrisonense*, Hayata.
10. *C. arvense*, Linn.
11. *C. schizopetalum*, Maxim.

Critical.

Having had the opportunity of examining at Kew most of the original specimens of *Cerastium* from Japan as well as the valuable specimens referred to in the list given above, I have been able to make a careful study of the various Japanese specimens in connection with those of my own collection. Before entering into a detailed account and criticism of each plant, I should like to preface my remarks with a few words as to the characters of systematic importance in the genus. Species of this genus cannot be distinguished by only a few characters. The habit, hairiness of stem, size and shape of leaves, characters of bracts, length and direction of pedicels, proportion of length between sepals and petals, size and shape of petals and direction of capsules, must all be consulted ; still they are to some extent not constant. Great care must be paid in examining the direction of the pedicels and capsules ; the pressing of the plants often causes them to assume a quite unnatural direction. It is also my conviction that the size and marking of nature seeds afford a very good distinctive character, though the various kinds of marking are rather difficult to describe satisfactorily in words.

Although my studies have been made mainly on the type specimens, I have occasionally been obliged to judge the opinions of previous workers on this subject only from descriptions, as the specimens were not always at my disposal.

According to Dr. Hayata the specimens of *C. pilosum* collected in Formosa are not perfect, so that it is rather difficult to say with certainty whether they really belong to that species.

Though I have not seen the original specimens of *C. oxalidiflorum*, Makino, I can readily decide from the author's precise description that the plant is conspecific with *C. pilosum*, Ledeb.

C. triviale, Link, is one of the most variable plants according to circumstances of habitat. The species is generally biennial or even perennial, though weak annual specimens are often met with. So far as I am aware the Japanese form of this plant, and especially that growing in the central and southern parts of the country, usually has leaves oval in form like those figured in Iwasaki's Honzo Dzufu* and Iinuma's Somoku Dzusetsu†, while in North Japan specimens often occur having narrow lanceolate leaves as figured in Vaillants' Botanicon Parisiense‡, Curtis and Hooker's Flora Londinensis,§ and Reichenbach's Icones Florae Germanicae.‖ The bracts of the Japanese plant are generally herbaceous, and the primary pair is usually foliaceous. The secondary bracts of the specimens gathered by myself near Nemuro, in the island of

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* Id. op. xlviii., fol. 14 verso.
† Id. op. viii. fol. 71.
‡ Id. tab. xxx., fig. 1.
§ Id. op. i., 2, tab. 42
‖ Id. op. v.–vi., fig. 4972.

Yezo, are scarious on the margin. As Franchet* states, Japanese specimens are mostly viscid, and I have seen no specimens from Japan without glandular hairs. I have been able to examine the specimens collected by Oldham at Nagasaki in 1862, which Maximowicz took for *C. vulgatum lusus hirsutum*, Fenzl, and which Williams determined as *C. triviale α typicum*, Williams. The specimens, however, show that it is really var. *glandulosum*, Koch and not an eglandular form.

I have not been able to examine the plants which Williams thought to be *C. pumilum*, Curtis, the occurence of which in Japan is quite doubtful. I doubt whether he really examined the specimens to which he refers under that name. One of these specimens collected by Savatier at Yokosuka and taken by Franchet for *C. glutinosum*, Fries, is, according to the statements of Franchet and Savatier in the second volume of their Enumeratio† said to be a glandular form of *C. triviale*, Link. I suspect, therefore, that the plants recorded as *C. glutinosum* or *C. semidecandrum*, var. *herbaceo-bracteatum*, may be small specimens of *C. triviale* var. *glandulosum*. The petals of this Japanese species are generally a little shorter than the calyx, oblanceolate and $\frac{1}{4}$-bilobed. The specimens collected by me in the neighbourhood of Nemuro have petals slightly exceeding the calyx in length, obovate-oblong, $\frac{1}{3}$-bilobed, and often subciliate at the base.

C. Ianthes, Williams, is, so far as I can decide from his original specimen, also a weak form of *C. triviale* var. *glandulosum*, though he places the plant near *C. nutans*, laying stress upon the length of the pedicels and the direction of the capsules. The pedicel of *C. triviale* is filiform and as long as or sometimes 3–4 times as long as the calyx, and the capsules are usually nutant.

About *C. glomeratum* I should make some remarks upon Williams' view. He refers to two specimens. The one was collected by Williams and Morrow at Shimoda and the other was gathered by Faurie in the island of Rebunshiri. He refers the Shimoda specimen after Franchet and Savatier, who considered it to be *C. viscosum* in the first volume of their Enumeratio and afterwards in the second volume doubted about it and have said " . . . . fortasse ad speciei sequentis (i.e., *C. vulgatum* = *C. triviale*) formam glandulosam referenda." The specimens from Rebunshiri, which Williams himself examined and preserved at Kew are, however, about 25 cm. high, solitary, distantly foliated with oblong, obtuse leaves, bearing a diffuse inflorescence with young flowers. They very much resemble the plant which I collected at some places in Hokkaidô and propose to name *C. boreale*. But as there exists no ripe fruit, the determination is rather conjectural; still so far I am quite sure that the specimens do not represent *C. glomeratum*, Thuill., so that *C. glomeratum* should be excluded from the Flora of Japan.

The plant believed by several botanists to be *C. alpinum* var. *Fischerianum*, is in fact neither the plant of Regel nor that of Torrey and Gray. The species is rather remotely related to

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* Franchet et Savatier, Enum. Pl. Japon. ii., p. 295.
† Franchet et Savatier, Enum. Pl. Japon. ii., pp. 294, 295.

C. rigidum, Ledeb., but differs in several points. As it has not yet been described by any botanist I have named it *C. Schmidtianum* in compliment to Fr. Schmidt who studied the flora of Saghalien and noticed the present plant. The specimen collected by Tschonoske in the province of Shinano and referred to as *C. alpinum* var. *Fischerianum* by Maximowicz and Williams is by no means *C. Schmidtianum*, Takeda, but is apparently *C. pilosum*, Ledeb. Maximowicz seems to have confused *C. pilosum* and the plant in question, for the specimens collected near Port St. Olga, Manchuria, and determined by him as *C. alpinum* var. *Fischerianum* are really *C. pilosum*, Ledeb., and not identical with my *C. Schmidtianum*.

C. robustum, Williams is, I think, a good species, though it resembles *C. Schmidtianum* in many respects; it differs, however, from the latter in having elongate lanceolate leaves, more or less attenuated towards the base, with seeds densely muricated. The primary pair of bracts of this plant are herbaceous, the others much smaller and scarious on the margin.

Judging from the description, *C. morrisonense*, Hayata seems to be closely allied to *C. arvense*, from the narrow-leaved form of which this plant is distinguished by having larger flowers with more deeply bilobed petals.

Maximowicz and Williams suppose that plate 30 of Sômoku Dzusetsu, vol. viii. represents *C. arvense*, Linn. The plant there figured is however *Moehringia lateriflora*, so that *C. arvense* cannot be reckoned a native of Japan.

C. schizopetalum, Maxim. is a very distinct species with 4-lobed petals. This is distributed in the alpine region of the high mountains of Central Japan.

Consequently the eleven species enumerated above should be reduced to seven. I add to them one new species and another one which is new to the Flora of Japan. The following enumeration comprises all the *Cerastia* known to me at present.

Enumeratio specierum mihi notarum.

1. **C. pilosum**, *Ledeb.* in Mém. Acad. Sc. St. Petersb. v, p. 539.—Bunge, in Ledeb. Fl. Alt. ii., p. 178.—Fenzl., in Ledeb. Fl. Ross. i., p. 398.—Turcz. Fl. Baic.-Dah. i., p. 240.—Regel, Tentam. Fl. Ussur. no. 95; Pl. Radd. i., p. 427.—Maxim. in Bull. Acad. Imp. Sc. St. Petersb. xviii., p. 385.—Komar. Fl. Ross. ii., p. 181.

Syn. *C. Ledebourianum*, Ser. in DC. Prodr. i., p. 420.

Var. *amurense*, Regel, Pl. Radd. i., p. 428.

Syn. *C. alpinum* var. *Fischerianum*, Maxim. l.c. p. 386, tamen quoad plantam Japonicam nec non pl. ex. St. Olga.—Williams, in Bull. Herb. Boiss. vii. (1899), p. 130, pro parte non Regel nec Torr. et Gr.

C. oxalidiplorum, Makino, in Tôkyô Bot. Mag. xix. (1905), p. 102.

Hab. Alpine pastures, prov. Shinano, *Tschonoske*, 1864; Mount Morrison? ex *B. Hayata*.

2. **C. triviale**, *Link*, Enum. Hort. Berol. i., p. 433.

Var. *glandulosum*, Koch, Syn. Fl. Germ. et Helv. ed. 1., p. 122, ed. 2, p. 134.—Williams, l.c. p. 132.

Syn. *C. vulgatum*, Thunb., Fl. Japon. p. 188.

C. vulgatum α brachypetalum lus. glandulosum, Fenzl, l.c. p. 408.—Miq. Prol. Fl. Japon. p. 10.—Franch. et Sav. Enum. Pl. Japon. i., p. 50, ii., p. 295.

C. vulgatum β glandulosum, Regel, Pl. Radd. i., p. 432.—Maxim. l.c. p. 386.

C. vulgatum lus. hirsutum, Maxim., l.c. nec Fenzl (fide spec. in herb. Kew.).

C. viscosum, Thunb., l.c.

C. triviale α typicum, Williams, l.c. p. 131 (fide spec. in herb. Kew.).

C. pumilum, Williams, l.c. p. 131, nec Curtis (fide spec. orignal. in herb. Kew.).

C. Ianthes, Williams, l.c. p. 131 (fide spec. original.).

Hab. Satporo, *Faurie*, 3. vi. 1887, no. 340, *K. Miyabe* et *Y. Tokubuchi*, 26. v. 1890; circa Hakodate, *Albrecht*, 1861; Sambongi, *Faurie*, 9, vi. 1886, no. 586; Tôkyô, *H. Takeda*, 21, v. 1902; *T. Terasaki*, v. 1906; Nagasaki, *Oldham*, 1862, no. 487; Yokohama, *J. Bisset*, v. 1876, no. 51; Japan, *Dickins*, x. 1881; *C. Wright*, 1853–56.

3. **C. rigidulum**, *Takeda*, sp. nov.

Species *C. malaschkensi*, Takeda, affinis, sed planta humiliore, sepalis brevioribus, petalis calycem non superantibus basi glabris, seminibus minoribus ad marginem non echinatis distinguitur.

Perenne; caulis fere pedalis, crassus, a basi ramosus, geniculatus, ferrugineo-pubescens, in parte superiore pilis glanduliferis immixtis. *Folia* crassiuscula, basilaria obovata basin versus attenuata, inferiora oblonga, media superioraque ovata vel oblongo-ovata, acutiuscula, pilis eglandulosis dense obsita. *Dichasium* 3–5-florum; pedicelli crassi, rigidi, centrales fructiferi erecto-patentes vel suberecti, apice vix incurvi, calyce fere triplo longiores; bracteae infimae foliaceae, omnes herbaceae. *Sepala* 8 mm. longa, lanceolata, acuta, margine scariosa, apice biloba, dorso glanduloso-pubescentia. *Petala* oblanceolato-oblonga, fere 8 mm. longa, apice lobis angustis acutis in $\frac{1}{4}$ parte biloba, basi glabra. *Capsula* late cylindracea, recta, apice vix curvata, calyce duplo longior, dentibus rectis obtusis. *Semina* matura triangulato-oblonga, compressa, ferruginea, tuberculata, 1·2 mm. longa.

Kurile Islands. ins. Shikotan: in port. Shakotan, *H. Takeda*, vii. 1909.

4. **C. boreale**, *Takeda*, sp. nov.

A. *C. triviale*, Link, cui remote affine, floribus majoribus, pedicellis crassioribus, seminibus majoribus oblongo-globosis nec triangulari-globosis tuberculis magis prominentibus distinguitur.

Caulis caespitosus, 15–30 cm. altus, erectus, simplex, basi divisus, modice pubescens, pilis reflexo-patentibus eglandulosis vestitus, in parte superiore pilis glandulosis immixtis. *Folia* inferiora oblongo-obovata, basin versus attenuata, superiora ovata, acuta, basi sessilia. omnia uninervia, hirsuto-pubescentia. *Dichasium* 3–7-florum; rami longe pedunculati; pedicelli fructiferi calyce triplo longiores, patuli, apice nutanti, pubescentes, pilis glanduligeris immixtis; bracteae anguste ovatae, acutae. *Sepala* lanceolata, acuta, late

scariosa, parte herbaceo glanduloso-pubescenti, 7 mm. longa. *Petala* elliptico-oblanceolata, calycem ad $\frac{1}{3}$ superantia, ad 1 cm. longa, leviter biloba, lobis anguste ovatis acutiusculis, basi glabra. *Capsula* calyce duplo longior, apicem versus leviter curviuscula, dentibus rectis obtusis. *Semina* oblongo-globosa, compressa, ferruginea, tuberculata.

Syn. *C. glomeratum*, Williams, l.c. p. 132, nec Thuill.

α scariosum ; bracteis superioribus margine scariosis.

Japan. Yezo: Tumoshiri prope Nemuro, *H. Takeda* 12. vii. 1909 ; Rebunshiri, *Faurie*, no. 7286.

β herbaceo-bracteatum ; bracteis omnibus herbaceis.

Kurile Islands. ins. Shikotan : Anama, *H. Takeda*, vii. 1909.

5. **C. Schmidtianum** Takeda, sp. nov.

Speciei praecedenti quoad staturam similis, sed ab ea caule robustiore, dichasio multifloro, petalis majoribus obovatis profunde bifidis nec oblanceolatis leviter bilobis, nec non foliorum forma distinguitur. Species etiam *C. rigido*, Ledeb., remote affinis, sed caule crassiore, foliis ovatis vel late ovatis nec basin versus attenuatis crassioribus, pedicellis centralibus patulis nec erectis, sepalis longioribus acutioribusque, petalis staminibusque non ciliatis, seminibus distantius tuberculatis differt.

Perenne ; caulis basi divisus, adscendens, geniculatus, robustus, ad 40 cm. altus, subsimplex, inferne pilis reversis eglandulosis, superne pilis glandulosis dense obsitus. *Folia* inferiora oblongo-obovata, obtusa, media oblongo-lanceolata, acutata, superiora remota, ovata vel late ovata, acuta, basi dilatata, saepe subamplexicaulia, omnia pilis brevibus rigidis pubescentia, saepe glanduloso-ciliata. *Dichasium* plerumque multiflorum, demum diffusum, ramis longe pedunculatis, viscidis ; pedicelli crassi viscidi, centrales fructiferi erecto-patentes vel subdeflexi, apice subnutantes, calycem duplo vel ultra superantes ; bracteae infimae foliaceae, supremae margine anguste scariosae, omnes viscidae. *Sepala* oblongo-lanceolata, acutiuscula, margine scariosa, dorso dense viscida, 6·5–7 mm. longa. *Petala* calyce subduplo longiora, obovato-cuneata, apice triente bifida, lobis obtusis, basi glabra. *Capsula* calyce duplo longior, conico-cylindracea, recta vel paulo curviuscula, dentibus rectis, obtusis. *Semina* oblongo-globosa, compressa, fusco-ferruginea, tuberculata, paulo ultra 1 mm. longa.

Syn. *C. Fischerianum*, A. Gray in Parry's Expedition, ii., p. 309.—Fr. Schm. Reis. Amurl. Sachal. p. 118, excl. syn. nec Sér.

C. alpinum var. *Fischerianum*, Fr. et Sav. l.c. i. p. 50, excl. syn. non Regel.—Maxim. l.c. pro parte tamen quoad pl. Japon. sachalinensemque, excl. syn. non Rgl.—Williams, l.c. p. 130, pro parte, excl. syn. nec Torr. et Gr.

Japan (probabiliter Yezo), *C. Wright*, 1853–56 ; *Harland*, no. 655 ; Hakodate, *C. P. Hodgson*, 1860 ; *Albrecht*, 1861 ; *R. Yatabe*, vii. 1878, *Faurie*, 160 (18. v. 1887) ; *K. Miyabe* et *Y. Tokubuchi*, 9. vii. 1890 ; Toyohira near Satporo, *S. Itô*, 5. vii. 1905 ; Satporo, in hort. bot. ex prov. Hidaka cult., *H. Takeda*, 24. vi. 1906 ; Saghalien, *Fr. Schmidt* ; Mauka, Saghalien, *T. Miyake*, 3. vii. 1906.

6. **C. robustum**, Williams, l.c. p. 129.

JAPAN. Yangeshiri island, rocky places, *Faurie*, 7165 (29. vii. 1891).

7. **C. ciliatum**, *Turcz.*, Fl. Bac.-Dah. i., p. 245.

Perenne; caulis caespitosus, 10–30 cm. vulgo 20 cm. altus, erectus, gracilis, simplex, basi divisus, medio glabrescens, linea 1 notatus, in parte suprema pubescens, pilis glandulosis patentibus brevibus densiuscule vestitus, saepe post anthesin elongatus et distanter foliatus. *Folia* caulina infima obovato-spathulata, basin versus attenuata, media et superiora lanceolata vel late lanceolata, sessilia, apiculata, acuta, uninervia, glabrescentia, saepius ciliata; turiones elongati, foliis basilaribus spathulatis supra pilosis ciliatisque, superioribus glabrescentibus ciliatis. *Dichasium* 3–9-florum; pedicelli centrales fructiferi erecto-patentes, apice plus minusve curvati, calycem 4–5-plo superantes, glanduloso-pubescentes; bracteae infimae plerumque foliaceae, ciliatae, superiores minores, late lanceolatae, margine membranaceae, in nervis puberulae, acutae. *Sepala* fere 5 mm. longa, elliptico-lanceolata, obtusa, apice plerumque leviter bifida, puberula, margine late-scariosa, saepius apicem versus atro-purpurea. *Petala* obovato-cuneata, basin versus valde attenuata, profunde in $\frac{1}{3}$ bifida, lobis ellipticis rotundatis, calyce duplo longiora, ungue glabra. *Capsula* calycem subduplo superans, conico-cylindracea, recta, dentibus rectis obtusis. *Semina* matura compresso-globosa, ferruginea, 1 mm. diametro, leviuscula, sub lente leviter rugulosa.

Syn. *C. vulgatum* var. *ciliatum*, Fenzl, l.c. i., p. 410.

C. alpinum β *Fischerianum lus. ciliatum*, Regel, Pl. Radd. i., p. 439.

JAPAN. Mt. Shirouma, alpine region, 10,000 ft., *H. Takeda*, viii. 1905.

The occurrence of this plant which is distributed in the Altai district and in Transbaicalia, Siberia, is highly interesting. It differs from *C. alpinum*, and especially from its narrow-leaved form, in being less hairy in all parts and in having smaller flowers and shorter pods as well as in the shape and marking of the seed. Our plant is also different from *C. glabratum* in its pubescent, shorter, obtuse sepals, ciliated leaves, and the nearly smooth seed. Fenzl united this species with *C. vulgatum*, but the plant described may be distinguished from *C. vulgatum* in having petals twice as long as the obtuse sepals, larger seeds which are compressed globose and indistinctly marked.

8. **C. morrisonense**, *Hayata*, Fl. Mont. Formos. p. 57.

JAPAN. In montibus Morrison, sec. *B. Hayata*.

9. **C. schizopetalum**, *Maxim.*, in Bull. Acad. Imp. Sc. St. Petersb. xxxii. p. 483.—Williams, l.c. p. 129.

JAPAN. In montibus Yatsugatake, *H. Takeda*, vii. 1903; in monte Komagatake, prov. Kai, *H. Takeda*, viii. 1903, viii. 1906; in monte Shôdzu, prov. Etchû, *H. Takeda*, viii. 1905; ad fl. Akagawara superior., prov. Shinano, *H. Takeda*, vii. 1907.

Plants unknown to me.

Specimens of the following plants which have been recorded in the Flora of Japan have not been at my disposal, so that I do not attempt to discuss them in this paper.

1. *C. vulgatum* var. *alpinum*, Fr. et Sav., Enum. Pl. Japon. ii., p. 239.

2. *C. vulgatum* var. *grandiflorum*, Maxim. in Miyabe, Fl. Kuril. p. 220.

3. *C. alpinum* var. *Beeringianum lus. flavescens*, Regel, Pl. Radd. i., p. 438.—Miyabe, l.c.

Clavis Specierum mihi Notarum.

The following key is based principally on characters of pedicels, sepals, petals, and leaves, &c. Characters of capsules and seeds are possibly not consulted, as they are not always to be had in herbarium specimens.

1. Petalis obovato-cuneatis apice integris interdum cuneatis, basi staminibusque ciliatis, sepalum obtusum 2–3-plo superantibus. Planta elata, pilosa, foliis tenuibus basin versus attenuatis
   1. *C. pilosum*, Ledeb., var. *amurense*, Regel.

   Petalis apice bifidis bilobis vel quadrilobis 2
2. Petalis oblanceolatis calyce maximo $1\frac{1}{3}$-plolon gioribus 3

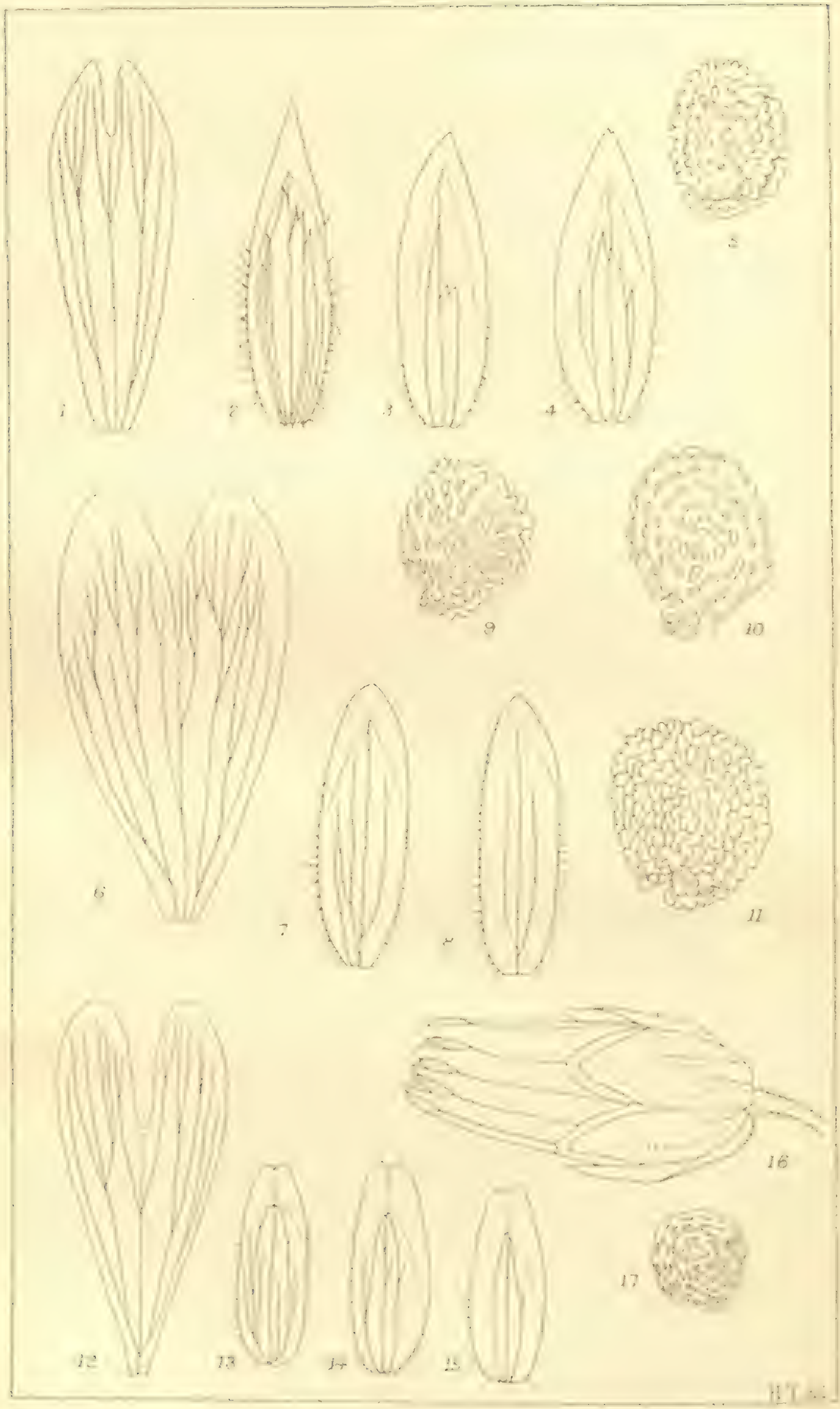
   Petalis obovato-cuneatis calyce minimo subduplo longioribus 5
3. Sepalis 6 mm. non excedentibus vulgo 4–5 mm. longis. Seminibus $\frac{3}{4}$ mm. longis triangulari-globosis granulato-tuberculatis, pedicellis filiformibus, petalis calyce brevioribus aequilongis vel calycem paulo longioribus basi interdum subciliatis. Planta tenuis, glandulosa
   2. *C. triviale*, Link, var. *glandulosum*, Koch.

   Sepalis 7–8 mm. longis. Seminibus 1 mm. longis vel paulo ultra tuberculatis; pedicellis crassis rigidis 4
4. Petalis calycem aequantibus. Seminibus subtriangulari-globosis $1\frac{1}{6}$ mm. longis, pedicellis rigidis apice vix incurvis. Planta crassa, geniculata, ferrugineo-pilosa, foliis ovatis acutis nec distante dispositis
   3. *C. rigidulum*, Takeda.

   Petalis calycem $\frac{1}{3}$ superantibus. Seminibus oblongo-globosis 1 mm. longis, pedicellis erecto-patentibus apice incurvis. Planta viridula, foliis superioribus distantibus
   4. *C. boreale*, Takeda.
5. Petalis bilobis 6

   Petalis cuneato-obovatis triente quadrilobis. Planta alpicola, ad pedalis, tenuis, viscida, foliis lineari-lanceolatis
   9. *C. schizopetalum*, Maxim.
6. Planta robusta, foliis late lanceolatis vel late ovatis ultra 3 cm. longis 7

   Planta caespitosa foliis lanceolatis vel lineari-lanceolatis longitudine 3 cm. non excedentibus 8



Japanese species of Cerastium.

65 92 428 1375 2 II.

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7. Foliis superioribus distantibus ovatis late obovatisve basi dilatatis, dichasio laxo, pedicellis subdeflexibus apice incurvis, seminibus 1 mm. diametro laxe tuberculatis. Planta in parte superiore viscida
5. *C. Schmidtianum*, Takeda.

Foliis late lanceolatis, inferioribus ad 7 cm. longis, basin versus subattenuatis, dichasio subcompacto, pedicellis apice paulo tantum curvatis, seminibus $1\frac{1}{3}$ mm. longis densissime elevato-tuberculatis.
6. *C. robustum*, Williams.

8. Sepalis circa 5 mm. longis obtusis leviter bilobis. Petalis 1 cm. non excedentibus triente bifidis. Foliis lanceolatis minimis 3 mm. latis glabrescentibus ciliatis. Planta alpicola, glabrescens ... ... 7. *C. ciliatum*, Turcz.

Sepalis 7·5 mm. longis lanceolatis, petalis ultra 1 cm. longis dimidio bifidis. Foliis lineari-lanceolatis infra 3 mm. latis ... ... 8. *C. morrisonense*, Hayata.

Explanation of Plate.

Figs. 1–5. *C. boreale*, Takeda.
„ 6–9. *C. Schmidtianum*, Takeda.
Fig. 10. *C. rigidulum*, Takeda.
„ 11. *C. robustum*, Williams.
Figs. 12–16. *C. ciliatum*, Turcz.

All seeds are magnified 18 times, except Fig. 17 which is 12 times. Other figures are enlarged five times natural size. Sepals are seen from inside.

IX.—THE BEECHWOOD INDUSTRY OF THE CHILTERNS.

W. Dallimore.

A good illustration of the way in which large industries may be established and towns built up through the presence of woodlands, from which a continuous supply of wood can be drawn, is to be seen in the Chiltern district. Here, dotted about in Buckinghamshire, Hertfordshire and some of the adjoining counties, there are several towns owing their existence almost entirely to wood-working trades which originated in connection with, and still owe much of their prosperity to the numerous woods in their respective neighbourhoods.

The beech, being the dominant tree of the Chilterns, enters largely into the various manufactures and the wood has long been a source of revenue to estate owners in the locality; for timber grown on the heavy soil, overlying chalk, which is peculiar to the country, has acquired a reputation for strength and durability which is unsurpassed.

A tour through the district reveals the fact, that while a considerable area is covered by beech woods, there are no very extensive plantations, the object apparently being to restrict tree growth to the positions least suitable for agricultural purposes and

to form long shelter belts for farm land. Thus, in many instances, whilst the crests and the higher slopes of hills are given over to timber, the lower slopes and valleys are in the hands of the farmer. Where, however, the lower and more sheltered ground is given up to beech, a remarkable difference is noticeable in the girth of the trees. A few trees of other kinds grow among the beech; the most common being oak, cherry, ash and hornbeam.

The general system with regard to felling, is to go through each wood periodically and remove a certain number of the large trees, together with badly placed trees. Gaps, so caused, are filled up by natural regeneration which is thus constantly in progress. Occasionally, however, a clear felling is made and, in such cases, larch usually forms the succeeding crop. No great quantity of beech appears to be planted, though now and then a mixture of larch and beech may be noted.

Difficulties arise when attempting to arrive at a satisfactory conclusion regarding the approximate value of beech timber in the Chilterns, for so many questions have to be considered which have either a favourable or adverse bearing on the question of price, that ninepence a cubic foot obtained in one place may be considered quite as satisfactory as eighteenpence a cubic foot elsewhere. The size and condition of the timber are of course the first considerations in determining the price, but such items as whether the timber is sold standing or felled; its distance from a good road and manufacturing centre, and whether it can be partly worked on the ground, are all subjects which help to determine its value.

Trees of small girth are sometimes well sold at from sixpence to ninepence a cubic foot, while trees with a large quarter girth have been known to reach half-a-crown a cubic foot in the neighbourhood of Chesham. The most frequent price for medium sized, clean grown trees would appear to be from one shilling to one shilling and sixpence a cubic foot.

Of the several towns where an outlet is found for beech timber, High Wycombe is perhaps the most important. As a centre for chair-making it is of world-wide fame, whilst general cabinet work and numerous minor industries are also established there. Beech timber enters largely into these various industries, and it is of special importance in the manufacture of chairs, though of late years a rival has sprung up in imported birch which arrives partly worked. Windsor chairs, with the exception of the seats, are made of beech, and many of the commoner upholstered chairs are also made from the same kind of wood.

Formerly, a considerable amount of work in preparing the wood for chair-making, such as the turning of legs, spindles, &c., was carried out in the woods; the articles being put together in factories and shops in the surrounding towns and villages. Men from these places found work in the woods for the greater part of the year, and in some cases bothies were erected for the accommodation of those men whose homes were too far distant to allow of their return each evening. For some years past, however, this practice has been gradually dying out, for the competition with machine-made articles and imported wood, already partly worked,

CHAIR-LEG INDUSTRY, GREAT HAMPDEN WOODS.

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has made it increasingly difficult for men working under the old conditions to earn an adequate means of livelihood. The practice, however, still obtains in a few places, and through the courtesy of the Earl of Buckinghamshire and his agent Mr. A. G. Hobart-Hampden, some particulars of the work were gleaned in the woods at Great Hampden during January.

The system is in vogue for local tradesmen to purchase a certain number of standing trees. They then send men into the woods whose business it is to cut the trees down and work them into legs and spindles of specified sizes. The wood is worked while quite green, for as soon as a tree is felled, it is cut up into 14, 16, or 18 inch lengths as required. These pieces are then split down the middle and quartered. Each quarter is again split, this time radially into sectors, each containing sufficient wood for three legs or spindles. A sector forms roughly an equilateral triangle, the base being wide enough for two legs and the apex for one leg. From a section of a trunk 12 to 13 inches in diameter, it is possible to obtain about two dozen legs, but if the wood were sawn instead of being split, it is probable that more could be made. The radial splitting of the wood is a matter of prime importance, for if it were split in any other way, the legs would be weak and liable to fracture. The rough pieces of wood, after being trimmed into shape with an axe, are turned and finished off by means of a primitive pole lathe installed in a quaint little thatched hut or 'shop.'

The lathe consists of an ordinary bed and mandrels, the power being obtained by means of an inclined, flexible pole, a thin rope and a treadle. One end of the pole, which may be from 12 to 15 feet long, is firmly secured outside the hut at a height of about 2 feet above the ground. The other end passes into the hut and in doing so rises, so that at the lathe it is several feet above the worker's head. To this end a loose rope is secured, the other end of the rope being passed between the bed and the rest of the machine and made fast to the treadle near the ground. In placing the object to be turned in position between the mandrels it is encircled by a turn of the rope. By using the treadle the object is made to revolve, first forwards as the pole descends, then backwards as it flies back into position. During the forward movement, the working tool is brought to bear on the chair leg or whatever is being turned, and in a very short space of time the article is removed in a finished state. The accompanying illustrations taken in the Great Hampden woods show the thatched huts packed round with wood shavings, the long lathe-pole passing into the hut and the rough timber for the chair-legs lying around.

Trees from medium to small girth are preferred to large trees for the purpose, and clean grown timber is necessary. From 9 to 12 dozen legs can be made by a man and a strong youth in a day, providing their timber is ready cut. When the legs leave the lathe they have a fine, smooth surface, and are taken without any further work and piled up in the open for partial seasoning in readiness for removal to a factory where the seasoning is completed.

Though men are employed at this work almost the year round, the result of their labours goes a very little way towards satisfying the demands of the Wycombe manufacturers, for it is said that

upwards of 2,000,000 chairs are made in the town annually. The method of working up the timber in the woods strikes one as being more wasteful than methods which obtain in factories; for, in the former case, not only does loss occur in spliting in place of sawing, but also the workers are unable to use up any timber which is inclined to be rough and which, on the other hand, might be converted into small articles of one description or another in a factory.

The question of turning the waste material into acetone has been considered, but owing to the lack of a large and constant supply and the low price offered, it would not be likely to prove a financial success.

As the town of High Wycombe is famous for its chairs, so Chesham is renowned for its brushes. The town contains a number of factories which expend the whole or the greater part of their energy on the manufacture of brushes. Though beech is not the only wood used in the brush-making trade, it is the most important, for no other wood has been found to answer so well for the blocks into which the hair or fibre is secured. These blocks have, of necessity, to be pierced by a large number of holes and very few woods are found which will stand the boring and subsequent wiring of the bunches of hair or fibre into position, so well as the beech. For large bass brooms and a few other kinds of similar construction, where the holes are comparatively few in number and the blocks thick, preference is given to birch on the question of lightness, but for all the smaller and denser kinds of brushes such as scrubbing brushes, clothes brushes, boot brushes, hair brushes, dandy brushes, &c., beech is invariably chosen. The majority of the smaller brushes are finished off with a back of some other kind of wood. These backs are sometimes attached directly to the block with its filling of hairs or fibre and wire, or there may be a thin veneer between the two. The kind of wood used for the backs differs in the various kinds of brushes. For scrubbing brushes, horse chestnut is most in favour on account of its whiteness, and makers state that brushes backed with this kind of wood find a more ready sale than those backed with woods which are less clean looking.

In the case of brushes with polished backs and handles, a wider range of woods may be used. Those with a little figure are preferred though figure is not of great moment. Cherry, sweet-chestnut, walnut, birch, &c., in addition to several foreign woods, are used.

Some idea of the importance of the brush business to Chesham may be gathered from the fact that one factory alone, which is engaged solely in the manufacture of brushes, finds regular employment for upwards of 150 men and women. By the kindness of Messrs. R. Webb and Sons I was enabled to see the whole process of up-to-date brush manufacture, and I am indebted to them for much information on the uses of beech and other timber.

Important as the brush-making industry is in the town, Chesham woodworkers find many other outlets for their talents, for there are numerous factories which manufacture a great variety of articles. Thus, in one factory visited, the owner had gained a reputation for malt shovels or barn shovels as they are variously called. These large, wide-mouthed shovels are shaped out of single pieces of wood.

Only trees which possess a large quarter girth are available for the purpose, for a shovel made from a plank taken from the centre of a tree would split easily and be of no value, therefore each shovel is sawn from a radial section of a quarter of the girth of a tree. These sections are then shaped, partly by hand and partly by machinery, and placed in an airy building to season. Colour has a bearing on the sale, consequently the shovels are smoked to a brownish colour before being delivered to dealers. Other woods, particularly poplar, are used for shovel-making, but they are less esteemed than beech. When shaping shovel handles, a good sized piece of wood is taken from each side; these are all utilized, for they are cut up into toy spades, cheap cricket bats, handles for toy tennis rackets, &c.

The manufacture of playthings from beech forms an extensive business. Hoops, and spades for the seaside, alone give employment to large numbers of men for many months of the year. Wood for hoops is cut into long thin laths the width of two hoops. The laths are planed and then seasoned; afterwards they are steamed and, while hot, bent into the required shape and placed in a mould until dry. Two laths are nailed together and the circle of wood is afterwards sawn through the middle to form two hoops. Spades, bats, handles of various descriptions, small household necessaries, heels for boots and shoes, spoons and various other articles are cut out of wood which is too small for shovels and other large articles, the wood being worked up to the smallest possible piece. Refuse is also made use of, for it is used as fuel to generate steam for the engines.

Boards cut from radial sections of the wood are used largely for panelling, either alone or as a base for veneer. Sections of large trees are brought into use in the manufacture of certain machines used in cloth mills, whilst spindles and shuttles required in the spinning of cotton are often made from beech. The same kind of wood is esteemed for butcher's trays, the heads of golf clubs, lasts for boots and shoes, and many other articles.

Beech is not used much by the builder but the handles of many of his smaller tools are made from it, and I was informed by a master builder a short time ago, that for stone-mason's mallets, no wood stands hard wear so well as beech, providing it is cut correctly.

Two kinds of beech wood have been described, "red" or "male beech" and "white" or "female beech." The difference is, that one is red in colour, the other white. Red beech is most highly esteemed, though its reputed value exists more in the imagination than in reality, for the so-called "red beech" is simply the steamed wood of an ordinary tree.

In addition to the towns referred to, there are others such as Berkhamsted and Watford which include wood-working among their industries, while in some of the larger villages throughout the Chiltern district, small factories and workshops are to be found.

It is hoped that a series of articles representing the application of beech and other British grown timbers, will be obtained in the near future for the Forestry Museum at Kew.

Explanation of Plates.

Fig. 1. Two thatched huts or 'shops' in the woods at Great Hampden. The lathe poles can be seen passing into the huts. A large heap of waste split wood occupies the middle of the picture and between it and the further hut there is a stack of wood split ready for turning.

Fig. 2. A front view of a thatched hut; shavings and wood chips are piled against the hut and cover the ground. The lathe pole is attached to an upright post in front of the hut and passes over the entrance into the hut; on the left a workman is spliting the logs into sectors. A stack of split wood ready to be turned may be seen at the back of the tree near the hut.

X.—MALLET BARK.

(*Eucalyptus occidentalis*, Endl., var. *astringens*, Maiden.)

Mallet Bark is one of the more important of the many tanning materials that have appeared in European commerce during recent years, and though considerable doubt existed for a time as to its botanical origin, its value as a tanning agent was readily recognised.

The early history of the commerce in this bark, which is a product of Western Australia, is given by Mr. E. M. Holmes in the Pharmaceutical Journal, February 4th, 1905, p. 141, under the name of *Eucalyptus occidentalis*, the name having been determined from flowering specimens of the plant received from a correspondent in Albany, Western Australia.

In the article referred to, the writer draws attention to the fact that some of the commercial bark is evidently derived from another species of Eucalyptus, an opinion confirmed by Mr. Maiden in the communication printed below.

Mr. Holmes, quoting from *Der Gerber*, xxx. December 15th, 1904, indicates that the following percentages of tannin available for leather manufacture are contained in the bark, viz., young bark 35 per cent.; medium bark 40 to 50 per cent.; old bark 39 to 70 per cent., giving an average of about 38 per cent. A specimen of the powdered bark analysed by Professor H. R. Procter gave tanning matter absorbed by hide 54·5 per cent.; soluble non-tanning matter 8 per cent., matter insoluble in water at 15° C., 25·3 per cent., and 11·6 per cent. water. The tintometer colour measurement of solution containing 0·5 per cent. of tanning matter in 1 cm. cell is given as red 3:0, yellow 8:6. Procter adds that there is no question that "it is one of the strongest natural tanning materials we have had through our hands."

The tanning matter when extracted has a cinnamon-brown colour. It is said to act quickly and easily, and to tan fully. But there appears to be some doubt as to the best method of using it, since

one Australian tanner states that it requires to be used like Valonia in conjunction with other tanning materials, for if used alone it makes a hard thin leather that becomes very brittle. The fact, however, that the demand for the bark has increased so rapidly since its introduction indicates that if used in proper proportions and under suitable conditions it is a valuable tanning material, at least to those who know how to use it. As the bark is easily powdered and the powder easily exhausted of its tannin by cold water, and the leather produced by it is of a pale colour, it evidently possesses considerable advantages, and if it can be produced at a cheaper rate than Mimosa bark, may become a strong competitor of that widely used product.

Mr. J. H. Maiden, Government Botanist of New South Wales, has kindly furnished the following particulars about Mallet Bark. He is of opinion that the tree which yields this product is a variety of *Eucalyptus occidentalis*, Endl., to which he has given the name *astringens*, Maiden :—

This has been a well-known article of commerce for the last six years at least, and as there has been some doubt as to its botanical origin, I spent a good deal of time during my botanical journeys in Western Australia (September–December, 1909), in endeavouring to clear up the matter.

The ordinary "Flat-topped Yate" is, in my view, typical *Eucalyptus occidentalis*, Endl. It is a tree with black hard bark for the lower half of the trunk, while the upper half of the bark is black and feathery, the loose bark quivering in the wind strongly reminding one of the feathers of a French fowl. The branches are more or less smooth or ribbony. The bark of this form has no commercial value.

The Mallet is a smooth barked Eucalypt—a Gum in Australian parlance. It also is more or less flat-topped, but quite distinct in appearance to the ordinary flat-topped Yate. No bushmen that I consulted would ever allow that the trees are the same.

I have described the Mallet as a variety (*astringens*), in the Journal Nat. Hist. and Science Soc. of Western Australia, 1910.

The ordinary Yate is *E. cornuta*, Labill. "The tops of a very high species of Eucalyptus which they (the natives) call Mallert" (Jas. Drummond in Hooker's Lond. Journal Bot.). This is the first instance I can find of the use of the name, which is always now called "Mallet," although one hears of other spellings, *e.g.*, "Mallat."

The commercial Mallet trees occur in a north and south strip of the South Eastern part of the State, practically following the Great Southern Railway from Beverley or Brookton to Mount Barker, and at a distance of about 40 miles on either side of the line. It is now prohibited by the Forest Department to cut Mallet Bark from any portion of the area 20 miles each side of the Great Southern Railway. It can be legally stripped from 1st March to 1st November.

The Acting Inspector-General of Forests informs me that the industry has fallen off during recent years, owing to the Mallet

within payable cartage of the Great Southern Railway Line having been cut out. The quantity of bark exported has fallen off from 318,315 cwts. in 1905 to 226,399 cwts. in 1908.

The truck loads of Mallet Bark at so many stations on the Great Southern Railway are a feature which serves to impress the magnitude of the industry on the memory.

In Western Australian commerce there are two recognised kinds of Mallet Bark, viz. :—

(*a.*) Brown Mallet (commercially the more valuable).

(*b.*) White Mallet.

There is a "Spotted Mallet," of which only five tons have been handled by a large firm especially interested in this trade (Messrs. Henry Wills & Co., of Albany), and this kind may be dismissed from notice for the present.

Stained inferior pieces known as Black Mallet are sometimes disposed of under a different brand and name. Sometimes "White Gum" bark (*E. redunca* and other species) is mixed by the strippers as an adulterant or unintentionally.

The pieces or strips are sent in by strippers in lengths of about 3 feet, and commonly 6 inches wide.

Brown Mallet.—This is the better variety and usually contains exudations of a brownish friable kino, which is quite evident to the eye, and a fracture discloses such. Externally it is whitish (brown stained) with greyish blotches. It would be classed by bushmen as a "White Gum."

I studied the Brown Mallet trees in the bush in several districts, and following are notes made by me on the spot in two of them.

Narrogin.—Erect in habit, both as regards trunk and branches. Flat-topped liked a broom or brush.

Grows on rises or ridges, not on swamps or flats ; therefore only in patches and not in large continuous areas. Grows on ironstone gravel and not on alluvial. Mr. J. H. Gregory (the local District Forester) has often seen Mallet 2 ft. 6 ins. in diameter. He has seen 10 to 15 bundles of bark from one tree, the weight of bark being usually 50–70 lbs. per bundle dry.

It may attain a diameter of several feet, but trees of such size have been destroyed in accessible places. It forms a dense almost impenetrable thicket of young saplings, and it seems to me that it would handsomely pay to thin out such saplings scientifically.

2. Near the Kalagan River bridge, Albany, Porongorups, to Stirling Range (near a sandstone cliff) we came across some Mallets which were being stripped for their bark. The trees are small, say 9 inches to 1 foot (I am informed there were some 18 inches). Bark perfectly smooth, dark and glossy. Underneath the bark is a layer of kino uniformly distributed. This is the Brown Mallet.

White Mallet.—Through the kindness of Messrs. Wills & Co., I obtained commercial samples of the White Mallet. This bark has a pinkish fracture and little or no kino. It is a "cleaner" bark than the Brown Mallet ; that is to say, a white, smooth bark with few stains of any kind.

Mr. J. H. Gregory described the White Mallet tree to me as more straggly than Brown Mallet. He says it is like a White Gum (*E. redunca*), and that one locality is 20 miles from Narrogin (near the Williams River).

To me it was a "Will o' the Wisp." Any White Mallet trees shown to me were similar to Brown Mallets, and I travelled many a mile after the White Mallet. Brown Mallets I felled myself and took herbarium specimens from them, but it remains to be proved if the White Mallet differs botanically from the Brown one.

Mallet Bark is chiefly shipped to the continent of Europe (largely, perhaps mainly) from Albany, and principally to Hamburg and Antwerp. For these two markets it is sent in sacks, broken or crushed into pieces about 2 inches long.

There is a smaller market for it in the Eastern States, principally New South Wales and Victoria, and for those markets it is shipped in powder.

For shipment from Albany it comes from Tambellup, Katanning, and even more northern stations.

The price of Mallet Bark was £4 15*s*. a ton on the trucks in 1909. Broome Hill seems a very active centre for it, in fact the local police say it is *the* centre.

The following are some bibliographical references to Mallet Bark :—

1. "Source of the new bark industry *Eucalyptus occidentalis*, the Flat-topped Yate"; by Dr. A. Morrison, *Journ. Agric. W. Australia*, September, 1904, p. 177.
   [This is Mallet, which is a flat-topped tree. "Flat-topped Yate" is *E. occidentalis*, normalis, J. H. M.]
2. "Mallet Bark," by E. M. Holmes, *Pharm. Journ.* 4th February, 1905, p. 141.
3. "Mallet Bark," by T. R. Sim, *Natal Agric. Journ. and Mining Record*, March 24th, 1905, vol. viii., no. 3, p. 209.
4. "An investigation of the barks of four West Australian species of Eucalyptus," by Henry G. Smith, *Journ. Agric. W. Australia*, 20th April, 1905, p. 219.
5. "Mallet Eucalypt Bark better than Black Wattle," by D. E. Hutchins, *Agric. Journ. Cape of Good Hope*, June, 1905, p. 784.

XI.—MISCELLANEOUS NOTES.

Foremen and Storekeeper.—The Lords Commissioners of His Majesty's Treasury have sanctioned, on the recommendation of the Board of Agriculture and Fisheries, the transfer of the Foremen and Storekeeper in the Royal Botanic Gardens from the temporary to the established staff, and Civil Service certificates have been issued for Messrs. G. Dear, W. Irving, C. P. Raffill, A. Osborn, T. W. Taylor and J. Coutts.

Mr. Harold Green, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Superintendent of the Botanical and Forestry Department, Hong Kong.

Mr. Harry Dodd, whose appointment as Curator of the Botanic Station at Onitsha, Southern Nigeria, was recorded in *Kew Bulletin*, 1906, p. 224, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

Presentations by Mrs. Cooke.—Mrs. Cooke has very kindly presented to Kew the bronzed terra-cotta model of the bust of the late Dr. Theodore Cooke which was made by the sculptor preparatory to the execution of the marble bust presented to the College of Science, Poona. The model was taken from life about fifteen years ago. Mrs. Cooke has also presented a selection of books from Dr. Cooke's library, among which may be mentioned, T. Moore's "British Ferns and their Allies," 1866, and "Vernacular names of Plants in the Presidency Proper, Bombay," 1901, by W. P. Symonds, which were not represented in the Kew Library. Two books of Indian and Queensland Ferns, also received from Mrs. Cooke to be dealt with at the discretion of the Director, have been presented to the Botanical Department of the East London College, Mile End Road.

Hooker's Icones Plantarum.—Three parts of this work have appeared since the last notice in the *Bulletin*. Part 4 of Volume xxix., including plates 2876–2900, was issued in June 1909. Plates 2876, 2877, represent *Manihot dichotoma*, Ule, the Jequié Maniçoba of Brazil, which is said to be one of the best rubber-yielding species of the genus. The remainder of the part is devoted to the genus *Sapium*, and includes numerous new or little-known species, among which are *S. Hippomane*, G. F. W. Meyer, and *S. utile*, Preuss, both of which yield rubber.

Part 1 of Volume xxx. was issued in January 1910. It is wholly devoted to the illustration of Asiatic species of *Impatiens*, described by Sir J. D. Hooker. Eight of the species figured are from Indo-China, six from the Western Himalaya, five from the Nilgiri Hills, three from China, and one each from Afghanistan and Nepal. Fourteen of the 25 species are described for the first time.

Part 2 of Volume xxx. appeared in January 1911. Eighteen of the plates illustrate new or recently described genera.

Gooringia, t. 2944, Caryophyllaceae, tribe Alsineae, differs from *Arenaria* by its tetramerous flowers and from *Buffonia* by the 4-valved capsule. *G. Littledalei*, F. N. Williams, has the habit of a *Sagina*. It is a native of Tibet and Sikkim.

Kolkwitzia, t. 2937, is a genus of Caprifoliaceae, tribe Caprifolieae, allied to *Abelia*. *K. amabilis*, Graebn., was introduced into England from Hupeh, Central China, by Mr. E. H. Wilson, who found it on cliffs in the Fang District, at 10,000 ft.

Plates 2939–2942 represent four monotypic South African genera of Ericaceae, originally described in the Flora Capensis. *Eremiopsis* differs from *Eremia* in its 1-celled, 1-ovuled ovary, and from all other South African heaths in the style, which is recurved at the base, then erect and incurved at the apex. *Lepterica* is near *Coccosperma*, from which it may be distinguished by the 1-ovuled ovary and eight stamens. The very numerous suberect parallel branchlets give it a peculiar habit. *Platycalyx* differs from *Erica* in having a gamosepalous calyx and ovules solitary in each cell. *Aniserica* is allied to *Sympieza* from which it differs in its campanulate, equally 4-lobed calyx.

Vellosiella, t. 2943, is a monotypic genus now placed in Scrophulariaceae, tribe Gerardieae, next *Melasma*. The spathaceous calyx distinguishes it from all other genera of Scrophulariaceae and together with the form of the corolla has the facies of Bignoniaceae, to which family it was formerly referred. *V. dracocephaloides* is a subscandent herb confined to the mountains of Brazil and British Guiana.

Acrymia is a monotypic genus of Labiatae, tribe Ajugoideae, allied to *Cymaria*, from which it may be distinguished by the 2-lobed upper lip which does not conceal the 1-celled anthers. *A. ajugiflora*, Prain, t. 2946, is a native of Perak, Malay Peninsula.

Titanotrichum, Solereder, t. 2936, is a genus of Gesneriaceae, tribe Didymocarpeae, which was described almost simultaneously by Hemsley under the name *Matsumuria*. It is founded on *Rehmannia? Oldhamii*, Hemsl., a native of Formosa.

Hypodaphnis, t. 2938, Lauraceae, tribe Perseeae, is allied to *Nectandra*, from which it differs in the presence of distinct filaments and the inferior ovary as well as in the position of the anther-locelli. *H. Zenkeri*, Stapf, is a native of the Cameroons.

Teonongia tonkinensis, Stapf, t. 2947, Moraceae, tribe Strebleae, is the rubber-tree of Tonkin. It was at first considered a species of *Streblus* and was afterwards described as a *Bleekrodia*. *Teonongia* differs from *Streblus* in the dehiscent fruit and the equal semiglobose cotyledons and from *Bleekrodia* in the perianth of the female flower.

Aristogeitonia, t. 2926, Euphorbiaceae, tribe Phyllantheae, differs from the other genera of the tribe which have digitately compound leaves in the inflorescence and in having a biseriate perianth in the flowers of both sexes. *A. limoniifolia*, Prain, is a native of Loanda, Angola. *Protomegabaria*, t. 2929, belongs to the same tribe, its affinities being with *Thecacoris* and *Maesobotrya*. Two species are known, both natives of West Tropical Africa.

Neodregea, t. 2931, Liliaceae, tribe Anguillarieae, is a monotypic genus allied to *Dipidax*, Laws. *N. Glassii*, C. H. Wright, has the habit of a dwarf *Ornithoglossum*, the flower (except the ovary) of *Androcymbium*, and the ovary of *Veratrum*. It is a native of Cape Colony.

Hancockia, t. 2945, is a monotypic genus of Orchidaceae, tribe Epidendreae, differing from *Nephelaphyllum* in its short 1-flowered scapes, subconnivent sepals and petals, and long slender spur. *H. uniflora*, Rolfe, was collected in mountain forests of Mengtze, Yunnan, by Mr. W. Hancock.

Heteranthoecia, t. 2927, Gramineae, tribe Paniceae, is intermediate between *Isachne* and *Coelachne*. *H. isachnoides*, Stapf, has been collected in Nupe and in the Snussi Country, French Congo. *Lintonia*, t. 2949, Gramineae, tribe Aveneae, is allied to the Australian genus *Astrebla*. *L. nutans*, Stapf, is known only from Nairobi, British East Africa. *Dignathia*, t. 2950, Gramineae, tribe Zoysieae, consists of two species, natives of British East Africa. It is allied to *Latipes*, Kunth.

Among the other plants figured are the following :—

Xylia Kerrii, Craib et Hutchinson, t. 2932, Leguminosae, tribe Adenanthereae, a native of Siam and Burma.

Brachylaena Hutchinsii, Hutchinson, t. 2928, Compositae, tribe Inuloideae, a native of British East Africa. It is a tree attaining a height of 90–100 ft., and yields a durable timber, which is not subject to the ravages of white ants.

Arrabidaea crassa, Sprague, t. 2933, Bignoniaceae, tribe Bignonieae, a very distinct species remarkable for its exserted stamens and acutely angled, almost winged capsule.

Ocotea usambarensis, Engl., t. 2934, Lauraceae, tribe Perseeae, a very valuable timber tree, native of Tropical East Africa.

Tylostemon ugandensis, Stapf, t. 2943, a native of Uganda, belongs to the same tribe.

Phyllanthodendron roseum, Craib et Hutchinson, t. 2935, Euphorbiaceae, tribe Phyllantheae, a native of Siam.

Arundinaria tesselata, Munro, t. 2930, the South African Bamboo, of which flowering specimens have only recently been collected.

"Die-Back" of Cacao and of Para Rubber.—*Diplodia cacaoicola*, P. Henn., was first observed on cacao wood from the Cameroons in 1896. Since that date the fungus has proved a veritable scourge in cacao plantations, in localities as far distant from each other as the West Indies, St. Thome, Federated Malay States, Phillipines, &c.

The form-genus *Diplodia* contains many injurious parasites, and in only a few instances the higher or ascigerous condition of the fungus is known. An attempt to solve the life-history of *D. cacaoicola*, was undertaken by Mr. Keith Bancroft, in the Jodrell Laboratory, at Kew, from material received from West Africa, teeming with the *Diplodia*, which has resulted in demonstrating that the *Diplodia* is followed in due course, on dead material, by an ascigerous condition of the fungus, which proves to belong to the genus *Thyridaria*. The species is new and has been described as *T. tarda*, Bancroft.

Further observations have proved that *Thyridaria tarda* is the cause of the "die-back" disease of the cacao plant and of the

"brown-rot" of cacao pods and that its *Diplodia* form is identical with that of the fungus which is the cause of the 'die-back.' disease of Para rubber in the Straits Settlements and Federated Malay States. It appears therefore highly probable that both diseases are primarily due to *Thyridaria tarda*.

A preliminary account of this fungus with a description and elucidation of the synonymy is given in the Agricultural Bulletin of the Straits and Federated Malay Straits, ix. (1910), pp. 475–478. A note was also published in the *Kew Bulletin*, 1910, pp. 93–95.

G. M.

Dacrydium cupressinum.—This tree, a native of New Zealand, where it is widely distributed, yields the wood known commercially as Rimu. From a correspondent of Kew we learn that Rimu varies very greatly in quality and texture according to the nature of the locality in which the tree grows. Thus in the northern part of North Island the tree while attaining a large size yields a timber, particularly when it grows in swampy ground, which is poor in colour and of coarse and open texture. The best quality is what is known locally as 'Mountain Rimu,' from trees grown at about, or over, 1000 ft. above sea-level, and in soil of a suitable character. Such trees are stated to be about 3 ft. in diameter and as a rule have a clean trunk of about 40 ft. In estimating the amount of 'prime wood' in such a tree the portion beyond the point where branching begins is said not to be considered.

Prime Mountain Rimu is stated to be sold in the London market at somewhere about 30*s.* per 100 ft. super net, but the price is understood to vary somewhat according to the demand.

The Queen Victoria Niagara Falls Park System.—The following account of the Park system in process of formation at Niagara Falls in the Dominion of Canada is part of an interesting communication received from Mr. H. J. Moore, Chief Gardener, formerly a member of the gardening staff at Kew. The scheme outlined promises to provide the Dominion of Canada with a most important botanical collection of trees, shrubs, and hardy plants, as well as a park system of remarkable beauty, unique in the grandeur of its surroundings:—

Many people who have visited the Falls of Niagara associate the name with the cataract only. The district, however, has other claims to fame. In the Niagara peninsula is to be found one of the finest fruit-producing countries in the world. Fruits from this district bring the highest prices, the quality of the peaches, apples and grapes (outdoor) being unsurpassed. The Niagara district also furnishes much of historical interest, for here were fought some of the bloodiest battles of the fierce conflict of 1812 which has had such an effect upon present day administration along both sides of the Niagara frontier.

On the Canadian side of the Niagara River extending about 26 miles between the villages of Queenston and Bridgeburg is a strip

of land which the Provincial Government of Ontario very wisely purchased and set aside as a national park, the total area of which is just over 800 acres. At one end of this reserve, near Lake Ontario, is the battlefield of Queenston Heights ; and at the other end the battlefield of Fort Erie. The city of Niagara Falls, Ontario, is about midway between these two points, and here the Queen Victoria Park Commissioners are doing a splendid work in developing a park system which will undoubtedly rank with the best in the world, both from an aesthetic and an educational standpoint.

Perhaps the most important project the Parks Commission have in hand is the construction of a boulevard extending from a point near the Falls to Bridgeburg 16 miles up the river. I need not enter into details of its construction; suffice it to say that each mile section along its course will be planted with one variety of shade tree, while at several points, where the width is sufficient, small parks will be formed. Along such sections of the boulevard as are somewhat removed from the river, avenues of trees will be planted, but where the river runs parallel with it the trees and shrubs will be grouped in such a manner that they will not obstruct the general view of the river, which is, in many places, over a mile in width.

The park system will undoubtedly be very attractive, enhanced as it is by the beauty of its environment. The proximity of large Canadian and American cities, such as St. Catharine's, Niagara Falls and Buffalo, renders its construction essential and in time it will no doubt rank with the best American park systems in point of utility as well as beauty.

The area in the vicinity of the Falls, amounting to two hundred acres, is being transformed and laid out more or less in the nature of a large botanical garden. The southerly portion will form the arboretum. A large range of iron-frame greenhouses and conservatories will be built to accommodate various exotic species and varieties of plants, also to furnish a sufficient space to display the decorative or greenhouse types, such as Chrysanthemums, Cyclamens, Primulas, &c., in their respective seasons.

The northerly portion, in which are situated the herbaceous borders and flower beds, also contains the baseball, football and cricket grounds, the tennis courts and bowling greens. In this area many beautiful and valuable specimen trees and shrubs are planted.

Coniferae are strongly represented and flourish well under the conditions at the Falls. Thuya occidentalis, Juniperus virginiana, Tsuga canadensis, Pinus Strobus and Taxus canadensis grow naturally at various points in the park proper and are also to be found in abundance along the lower Niagara Gorge.

Evergreens other than conifers are rare, very few of the broad-leaved type have up to the present proved hardy enough to stand the rigours of the severe Canadian winters, therefore this class of plants is only represented by such subjects as Rhododendron catawbiense, R. maximum, and Kalmia latifolia.

There are many remarkable specimens of deciduous trees, some of which are growing naturally, while others, perhaps the majority, have been planted. Splendid specimens of Ulmus americana,

Aesculus Hippocastanum and Fraxinus americana are to be seen at every turn; Juglans nigra, the Black Walnut, is fairly common and attains a great height, many specimens in the Park are at least 80 feet high.

Catalpa Bungei, C. speciosa, C. bignonioides, Liriodendron Tulipifera, Quercus coccinea, Q. palustris, Q. rubra, Tilia europaea, and T. americana are also included among our arboreal specimens. Of the genus Fagus we have three species, namely, F. ferruginea, F. sylvatica and its variety purpurea.

Nowhere do hardy shrubs flourish better than at Niagara Falls, the spray conditions being such that plant life very rarely suffers from drought, consequently the shrubs are healthy and vigorous, although in the past they have suffered somewhat through lack of proper pruning and thinning; the same is also true of the trees.

Berberis Thunbergii, B. vulgaris, B. Aquifolium and B. canadensis thrive splendidly. Cornus of many species, Forsythias, Ligustrums, Hydrangeas, Loniceras, Deutzias, including both single and double flowering kinds, such as D. crenata, D. Lemoinei, D. candidissima, D. gracilis, and D. scabra also flourish. There are in addition a few varieties of the above species.

The herbaceous garden has during the past been arranged in the form of a huge border, but steps are being taken to arrange the whole collection botanically after the Kew method. Space forbids a detailed account of the species and varieties of herbaceous plants, but from the fact that the garden covers one acre of ground, the number of plants may be approximately estimated. Liliums, Phlox and perennial Asters flower profusely, each in their respective seasons affording a beautiful sight to the thousands of visitors who annually visit the Park.

The proposed arboretum in the southerly portion of the park will be so designed that the trees and shrubs can be planted botanically in groups for educational purposes. There will be a pinetum, an ericaceous garden containing a Rhododendron glen and a collection of lilacs amongst other features. I mention these simply to give the idea of what is contemplated. All trees and shrubs indigenous to temperate North America and especially to Canada will be planted in this area, while acclimatized exotic subjects will also be included in the collection.

A better location for an arboretum would be hard to find; on the west the area is flanked by an escarpment 100 feet high covered with beautiful hardwood trees interspersed with a few pines. It is sheltered from violent storms from that quarter, also in some degree from the north, as the escarpment bends round and covers a distance of two and three-quarter miles. At the most southerly point are situated the beautiful Dufferin Islands. The Niagara River borders the entire park system on its eastern side. In both the old and newer portions of the park system the trees and shrubs will be named after the method in vogue in Kew, lead labels being used. One of the objects of the Park Commission is to develop the park system along educational lines, and the Commission and their Superintendent, Mr. John H. Jackson, have entered upon the work in the right spirit. What the Ontario Agricultural College is to the Province in agriculture, so will the Queen Victoria Park be to

the Province and to the Dominion of Canada in horticulture and botany. In landscape beauty the park system will undoubtedly rank amongst the best of its kind, for glorious natural features abound on every hand.

There are four power generating stations in the park, the Toronto Power Company's, the Canadian Niagara Power Company's, the International Railroad Company's, and the Ontario Power Company's. The Toronto Power Company's generating station is a magnificent structure, and although it is not quite completed it has the appearance of a beautiful library or museum. In the immediate foreground are beds sunk in concrete, the whole being arranged in the form of a terrace approached by steps. In these beds are usually planted sub-tropical and ordinary bedding planting plants in spring, and in the autumn bulbous plants such as Tulips, Hyacinths, and Narcissus.

The Administration Building contains the offices of the Parks Commission and of the Superintendent and his staff; the basement is divided into lavatories and Constables' headquarters. The second floor serves as a restaurant, while the Board room of the Commisssion and their bedrooms are on the top or third floor. These rooms are only used when the Board is in session. Standing as it does in proximity to both the American and Canadian Falls the building has a very desirable location and from its balconies splendid views can be obtained.

The Office Staff of the park is composed of the Superintendent and his Assistant, a Landscape Gardener, an Assistant Engineer and two Draughtsmen, an Accountant and Assistant Stenographer. The number of men employed in the park proper is about 80 in summer, this number being reduced to probably 20 in winter; the greenhouse staff of four men is permanent. The total number of men employed in the entire park system, including the outlying parks and boulevard is approximately 120. This number of necessity must be greatly increased as the boulevard is extended.

There are only four trained gardeners employed by the Parks Commission, two of them Kew men. I have met many gardeners from Britain, and am glad to say that in nearly every case the best positions are held by old Kewites. I may state that the mere fact of having taken the Kew course places a man in the front rank of horticulturists out here. Let me say that nowhere else is it possible for a gardener to obtain such a training as Kew affords. This fact strikes home to many a Kewite, when Kew to him is a thing of the past.

As an old Kewite I would advise the young fellows in Kew to make the best of their time, not only as far as practical work is concerned, but also in the various courses of lectures. Two years is a very short period, they should, therefore, crowd all they possibly can into them. The opportunity will never come again, and when they leave they should remember it is their duty wherever they may be to uphold the reputation of Kew. By so doing the chances of their fellow Kewites are materially improved.

Botanical Magazine for February.—The plants figured are *Meliosma cuneifolia*, Franch. (t. 8357); *Kennedya Beckxiana*, F. v. Muell. (t. 8358); *Urceocharis edentata*, C. H. Wright (t. 8359); *Prunus microcarpa*, C. A. Mey. (t. 8360); and *Masdevallia pachyura*, Reichb. f. (t. 8361).

The *Meliosma* is a Chinese plant found in Szechuan, Hupeh and Yunnan. The specimen figured was raised from seeds collected on Mount Omi and sent to Messrs. J. Veitch and Sons by Mr. E. H. Wilson. This genus is the only one of its order, *Sabiaceae*, which can be grown in the open in Great Britain. With its many-flowered, pyramidal panicles of small, greenish-yellow flowers it forms an interesting addition to our collections of ornamental shrubs. *Kennedya Beckxiana* is a striking greenhouse twining plant from New South Wales and was raised at Kew from seed purchased from Mr. J. Staer, Wahroonga, New South Wales, in 1908. The flowers are a good red with a greenish-yellow patch at the base of the standard and are larger than those of any other *Kennedya* in cultivation. The *Urceocharis* which forms the subject of the next plate appears to be a natural hybrid between *Urceolina pendula* and *Eucharis grandiflora* and is very similar to the hybrid *Urceocharis Clibrani*, Mast., raised by Messrs. Clibran and described in 1892. The plant figured was collected in Peru by Mr. Forget and was purchased from Messrs. Sander and Sons, St. Albans. It flowered at Kew in a moist tropical house in July, 1909. The delicate little Cherry, *Prunus microcarpa*, was acquired for Kew from Zoeschen in 1900 and is a native of the near East. The species is a variable one as regards habit and tomentum, the form depicted resembles most closely *Cerasus tortuosa*, Boiss. & Hausskn. Under cultivation it requires a sunny situation and though it flowers freely in May it seldom sets fruits in this country. The *Masdevallia* is a member of the small group *Amandae* with racemose flowers and comes from Ecuador where it was discovered by Roezl. It was described as long ago as 1874. Mr. Consul Lehmann introduced the plant to cultivation having sent plants to Mr. J. O'Brien, with whom it flowered in 1897. In its native country it is found at from 5600–8300 feet above sea level in damp thick woods on trees or occasionally on rocks.

Lagos Silk Rubber Tree (*Funtumia elastica*).—This species which is under experimental cultivation in many tropical countries, is indigenous both to East and West Tropical Africa. In these regions it is widely exploited for rubber which, when carefully prepared, finds a ready market and commands a high price.

The Provincial Forest Officer, Western Province, Southern Nigeria has conducted a series of experiments both in tapping and coagulating the latex of this tree; the following observations upon the results obtained being gathered from the "Annual Report on the Forestry and Agricultural Departments for the year 1909," p. 7, published at Lagos in 1910.

"There are two ways of tapping this tree for latex, namely the excision and the incision systems.

"By the excision method deep cuts as far as the cambium are made, while by the incision system only shallow channels are opened, just deep enough to allow the latex to run down the tree; incisions are then made into these channels by means of a pricker.

"Of the incision tapping, the most satisfactory results, so far as the quantity of latex is concerned, were obtained from the spiral system; this gave in comparison with the total length of cuts the highest yields of latex.

"Taking it all round however the experiments carried out with the excision method have been very disappointing. Trees tapped last year for the first time, and tapped on the same area this year gave only one-tenth of the amount of latex yielded last year. This shows that a tree has to be given many years' rest after one tapping before it can be profitably tapped again.

"There seems to me but little doubt left that the incision tapping by means of a pricker is the right method for Funtumia trees, as there is comparatively little damage done to the plant and, as Dr. Christy of Uganda assured us, a tree can be tapped three times a year without showing a decrease in yield.

"Experiments were also made in connection with the preparation of Funtumia rubber.

"Of the cold methods, *i.e.*, coagulation without boiling the latex—purub and acetic had no effect on the Funtumia latex. Good biscuits can be prepared by adding formalin or absolute alcohol to the latter. But there is no reason why the native should use expensive chemicals for the preparation of his rubber, as good thin biscuits can just as well be made by simply boiling the latex and then washing and pressing it, the principal thing being to boil as small a quantity of latex as possible at a time, so as to ensure the preparation of very thin biscuits. The latter are then easily dried."

Notes on *F. elastica* will be found in the *Kew Bulletin*, 1905, p. 56; 1907, pp. 187 and 249; 1909, p. 147 and 1910, p. 206.

Forestry among the Chinese.—It is curious to turn from the deliberately business-like method with which a European nation attacks the question of afforestation to the slow and irregular beginnings of the idea of forestry in the Oriental mind. To the Chinese the very notion of the conservation of forest, or of the afforestation of denuded ground, is foreign. The Mandarins and petty officials, though, no doubt, excellent guardians of the peace, do not make it their business to plan public works for the benefit of the communities over which they preside, and there is not enough co-operation among the people themselves to enable them to organise on their own account any extended scheme, such as would be required for an effective commencement of forestry. In order to understand the peculiar indifference, or almost resistance, to the idea of forestry which is found in South China, it is necessary to remember that the present inhabitants, originating from the north, and penetrating in past ages little by little into the virgin forests which then covered the mountains before them, came to regard it as a virtue to clear from the ground the trees which afforded

shelter to the wild beasts, and at the same time impeded their agriculture. As large cities began to spring up it was natural, moreover, that, along the river valleys and other places whence timber and fuel could be cheaply transported to them, a regular system of exploiting this produce should become prevalent. At the present time, in districts like the one near Hong Kong, with which the writer is well acquainted, the process of exploitation has been succeeded by one of absolute denudation. The cutting of the trees for timber has been followed by long-continued clearing of the secondary undergrowth, and as scrub, however tenacious, will not survive many centuries of constant cropping, many of the mountain sides have become quite bare of all kinds of vegetation except an irregular growth of coarse grass.

It is in this sort of country, where cultivated ground is scarce, and steep mountain ranges abundant, where the streams are drying up year by year, as their valleys lose their verdure, and where the supply of fuel is far below the demand, that the first efforts towards forestry are becoming apparent. In many parts of China the country folk are still divided more or less distinctly into two races, often with their separate villages, and with their different dialects—one representing the older and less-civilised population, which had become dominated by a more highly cultured invading race, and had been driven by them into the mountains and other unfavourable tracts of country. It is among the older and wilder portion that the remains of woodcraft is found, and it is naturally among them that interest in re-afforestation becomes first apparent. In Kwantung Province, while the more civilised agricultural population, sometimes called Punti, confine their attention to the rich alluvial tracts along the sea-shore and in the larger valleys, the wild hill men or Hakka people get what living they can by cultivating the small mountain valleys and the more fertile slopes around them. It is these latter who have made the most general practice of forming plantations, mostly of pine trees, on the hills round their villages; but they have not developed a sound principle of forestry, and therefore obtain only a scanty return for the labour expended upon it. It is indeed quite a rare thing to see any trees planted by the Chinese permitted to attain their proper development for market purposes.

It is interesting to see the effect of the introduction of western scientific methods of forestry among a population which has already arrived at the stage above indicated. The Chinese are extremely loth to adopt any method which is strikingly different to that employed by their ancestors before them, and it is only very gradually that any attempted improvement of their operations finds favour among them. It is in fact only when direct and obvious advantages are observed by them to follow a new plan that they take any interest in it at all. The inhabitants of the district, some six hundred square miles in extent, which has come under the control of the British government of Hong Kong, have for the last thirty years had an opportunity of seeing the effect of re-afforestation on sound modern principles. A large number of them have actually been employed by the British forestry department, and others are having the advantages of forestry brought before their notice in the

native schools throughout the territory, and at the present time there are certainly signs of an awakening to an aspect of forestry which is entirely new to them. They are beginning to appreciate the advantages which accrue to the whole neighbourhood from the systematic planting of the bare hills. The plantations established by the Chinese are more extended, and better tended than they were ten years ago. Enquiries from Chinese authorities in various parts of South China have moreover been received in Hong Kong as to the best means of obtaining instruction in forestry for their people and as regards the best species to plant, and the best way of managing them. It does not require much consideration to appreciate the vast importance to the Chinese nation of these preliminary movements towards the re-afforestation of their bare hills. There are few places in the world where good coniferous timber will grow more easily or more quickly than in certain parts of South China, and it might very easily not only supply its own needs of timber and fuel, but even replace its timber import trade by a flourishing output of valuable soft and hard woods into the neighbouring commercial centres of the Southern Pacific.

S. T. D.

The Broad Stone of Empire.*—In this important and interesting work, Sir Charles Bruce deals with the problems of Crown Colony administration, and gives an exhaustive survey of our policy, National, Colonial and Imperial, and of all the factors concerned with the development of the dominions of the British Empire. To review so comprehensive a book is beside our functions, though from the close association of Kew with the Colonies the numerous botanical and agricultural problems referred to in the earlier pages deserve more than passing notice.

Chapters xviii. and xix., dealing respectively with Agriculture and Forestry, concern Kew more nearly, since, as Sir Charles points out, "The gardens have, in fact, for 150 years been the botanical headquarters of the Empire."

The development of the organised agricultural system in the West Indies is described in detail and, as with most of the problems dealt with in the book, the author has been able to bring his great personal experience to illustrate his review of the course of events. The wisdom of the establishment of Botanic Stations and Gardens, of Agricultural organisation and of definite systems of forest preservation is ably demonstrated. In the records placed before us there are on all sides sad stories of neglect, indifference and reckless waste, but there is also the history of the gradual ascendancy of wiser councils and of the adoption of more definite lines of policy, some of which, and by no means the least important, as the printed records show, have emanated from Kew.

The book should be carefully studied by all who are interested in the rise and progress of our colonial administration.

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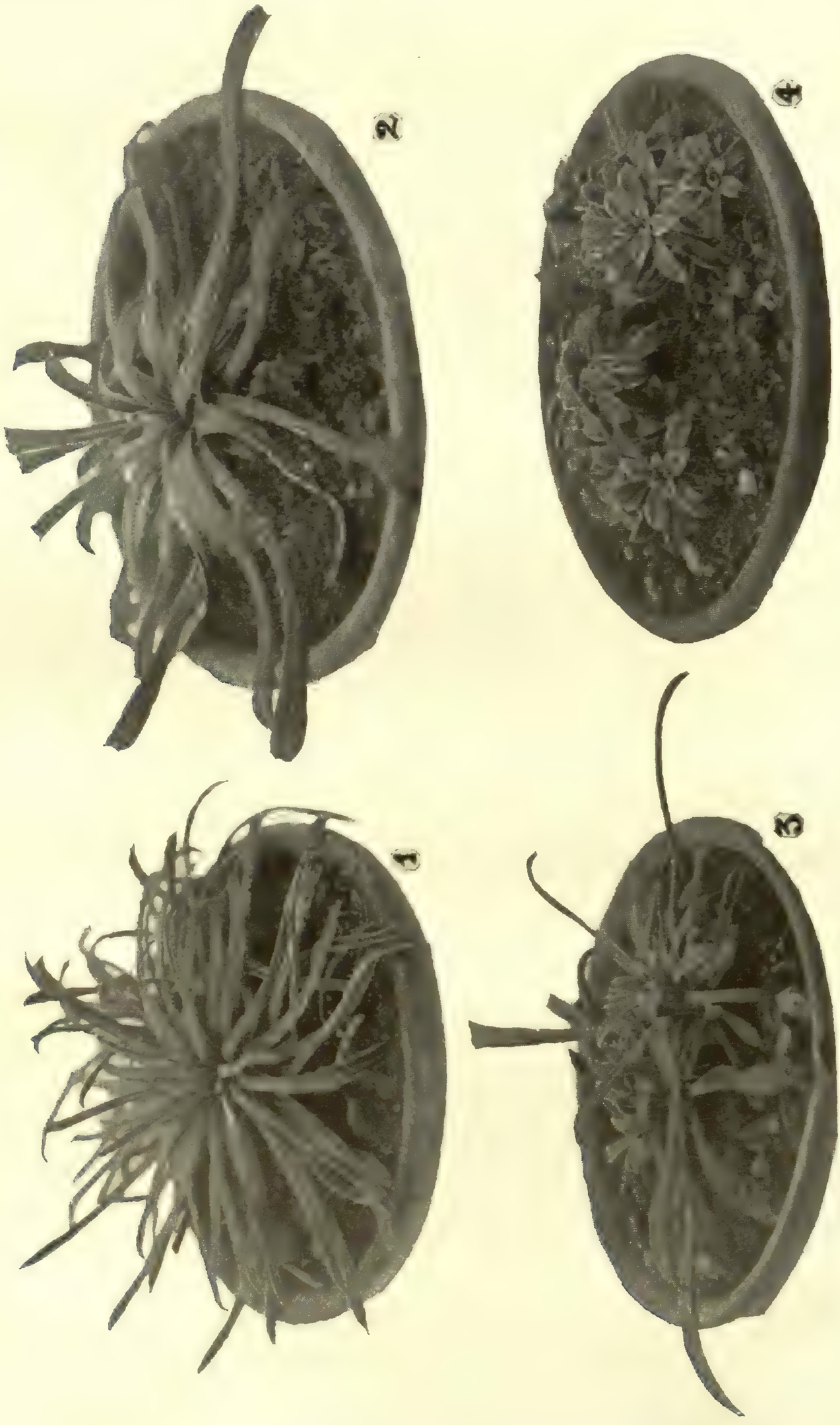
* The Broad Stone of Empire. Problems of Crown Colony Administration with records of personal experience, by Sir Charles Bruce, G.C.M.G., with Maps 2 vols. Macmillan & Co., Ltd., London, 1910.



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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 3.] [1911.

XII.—SAXIFRAGA LINGULATA AND S. LANTOSCANA.

T. A. Sprague.

Recent correspondence in the Gardeners' Chronicle (ser. 3, vol. xlviii. pp. 311, 340, 371, 416, 426, 454, 474, Oct. 29–Dec. 24, 1910) has shown that some horticulturists claim specific status for *Saxifraga lantoscana*, while others prefer to treat it as a variety of *S. lingulata*. Apart from this difference of opinion, some confusion has arisen as to matters of fact, and it seems desirable, therefore, to give an historical account of the matter.

As the question whether a given group should be regarded as a variety or a distinct species depends partly on the definitions assigned to these terms, it may be well to state that the writer is in entire accordance with the views elaborated by Briquet in the preface to the third volume of Burnat's Flore des Alpes Maritimes. As numerous intermediate forms (apart from possible hybrids) undoubtedly exist between *S. lingulata* and *S. lantoscana*, the latter is here regarded as a variety of *S. lingulata*.

It is obvious that no classification of *S. lingulata* and *S. lantoscana* can be considered satisfactory which is not based on the study of all the varieties of *S. lingulata*, and it will therefore be necessary also to take into consideration *S. australis*, Moric. The species *S. cochlearis*, Reichb., *S. catalaunica*, Boiss. et Reut., and *S. crustata*, Vest., have been considered varieties of *S. lingulata*, but they are now generally accorded separate rank, and their history need not be traced.

Saxifraga lingulata was described in 1792 by Bellardi, Appendix ad Floram Pedemontanam, p. 20, from specimens collected in the Pesio valley, the mountains of Limone and elsewhere in Piedmont. As Bellardi's work appears to be scarce, his diagnosis may be reproduced :—

"*Saxifraga lingulata.* Saxifraga foliis radicatis longissimis linearibus sulcatis cartilagineis integerrimis, caule folioso paniculato. Frequens in alpibus maritimis locis rupestribus, praecipue in valle

(19061—6a.) Wt 118—9. 1125. 4/11. D & S.

Pisii, in montibus Limoni, aliisque locis alpinis Monregalensibus. . . . . Pro nova et distincta species colitur in hortis Londinensibus, referente cl. Smithio, cui plura specimina misi."

Specimens of *S. lingulata* collected by Bellardi in Piedmont were distributed in James Dickson's Collection of Dried Plants, fasc. 3, 1791, No. 63, accompanied by a printed ticket as follows :—

"*Saxifraga callosa*, Smith, Obs. Bot. ined. Foliis radicalibus aggregatis lineari-lingulatis margine cartilagineo-tuberculatis, caule paniculato. Sm. — Piedmont, Dr. Bellardi, August."

Smith's name thus antedates Bellardi's by a year, but it has never been accepted by other botanists. In Rees's Cyclopaedia, vol. xxxi. 1819, under *Saxifraga*, No. 2, Smith retained the name *S. callosa*, however, and quoted as a synonym *S. longifolia*, Lapeyr., from which A. P. De Candolle had carefully distinguished it four years previously.

S. lingulata, Bellardi, did not obtain recognition as a distinct species until thirteen years had elapsed after its publication. Lamarck and De Candolle in 1805 quoted it as a synonym of *S. longifolia*, Lapeyr. (Fl. Franç. ed. 3, vol. iv. p. 359); and Sternberg in 1810 referred it to *S. longifolia*, var. *a* (Rev. Saxifr. p. 1). In 1815, however, De Candolle recognised it as a distinct species (Fl. Franç. ed. 3, vol. vi. p. 516): and in 1819 Bertoloni gave a long and careful description of it in his Flora Alpium Apuanarum (Amoen. Ital. p. 358).

Saxifraga australis was described in 1820 by Moricand, Flora Veneta, p. 431, from material collected on Mt. Virgine near Naples by Gussone, who sent it to Moricand under the name *S. Aizoon*. Moricand's diagnosis is as follows :—

"*Saxifraga australis*, nob. S. foliis radicalibus rosulatis lanceolatis margine incrustatis basi ciliatis; caulinis ovatis subdenticulatis acutis; caule glabro anguloso, panicula ramosa multiflora; calycibus glabris, petalis ovatis obtusis calyce triplo longioribus."

In 1830 Seringe in DC. Prodr. vol. iv. p. 20 gave an amended description of *S. australis*, as follows :—

"*S. australis* (Moric! fl. ven. i. p. 431) glaberrima, caule anguloso, foliis rosularum oblongo-spathulatis margine crustaceis basi ciliatis, caulinis oblongis subdenticulatis acutiusculis, panicula ramosa multiflora, petalis ovatis obtusis calyce multo longioribus, stylis per anthesin rectis adscendentibus. Planta rhizocarpica. In monte Virgine prope Neapolim. . . . Nullo modo differt ex Moretti a S. longifolia (v. s. in herb. Moricand). Speciei character non satis notus."

In 1823 Moretti, Tent. Saxifr. p. 5, had reduced *S. australis*, Moric., doubtfully to *S. lingulata*; and this reduction was confirmed by Gussone, Fl. Sic. Prodr. vol. i. 1827, p. 482: Tenore, Fl. Nap. vol. iv. 1830, pp. 59, 191; Sternberg, Rev. Saxifr. Suppl. 2, 1831, p. 53; Bertoloni, Fl. Ital. vol. iv. 1839, p. 456; and Moris, Fl. Sard. vol. ii. 1840–1843, p. 146, t. 74. Tenore, l.c. 59 (Syll. Fl. Nap. p. 200) also reduced *S. thyrsoidea*, Tausch in Syll. Ratisb. vol. ii. 1828, p. 240, to *S. lingulata*, var. *australis*. This reduction, however, escaped the notice of subsequent botanists, and *S. thyrsoidea* was lost sight of. Engler did not account for it in his monograph of *Saxifraga*, and it appeared as an independent species in the Index Kewensis.

Gussone in 1842 restored specific rank to *S. australis*, having in the meantime seen specimens of typical *S. lingulata* from the Col di Tenda (Florae Siculae Synopsis, vol. i. p. 466). Subsequent writers on Sicilian botany, including Strobl in Flora, 1887, p. 164, and Lojacono, Flora Sicula, vol. i. part 2, p. 209, also kept up *S. australis;* whereas Engler, Monogr. d. Gattung Saxifraga, 1872, p. 237, Nyman, Consp. Fl. Eur. p. 267, and Fiori and Paoletti, Fl. Anal. Ital. vol. i. 1898, p. 538, who dealt with a wider area, treated it as a variety of *S. lingulata.*

Saxifraga lantoscana, Boiss. et Reut., was discovered by the authors in the Lantosque valley, Alpes Maritimes, and was described in Boissier, Diagn. Pl. Nov. ser. 2, No. 2, 1856, p. 63, from flowering specimens cultivated in Boissier's garden at Valleyres.

Ardoino, Fl. Alp.-Mar. 1867, p. 149, and Rouy, Suites Fl. Fr. vol. ii. p. 61, retained *S. lantoscana* as a distinct species. Engler, Monogr. d. Gattung Saxifraga, 1872, p. 237, reduced it to a variety of *S. lingulata;* and this reduction has been accepted by Nyman, Consp. Fl. Eur. 1882, p. 267; Arcangeli, Comp. Fl. Ital. 1882, p. 255; Ball in Trans. Linn. Soc. ser. 2, vol. v. 1896, p. 160; Fiori and Paoletti, Fl. Anal. Ital. vol. i. 1898, p. 538; Rouy and Camus, Fl. de France, vol. vii. 1901, p. 79; Burnat, Fl. Alpes Marit. vol. iii. 1902, p. 260; and Coste, Fl. de France vol. ii. 1903, p. 138.

From the foregoing account it will have been gathered that there is a large preponderance of opinion in favour of including *S. australis* and *S. lantoscana* under *S. lingulata.* As might be expected, the narrower conception of *S. lingulata* appears to be confined to botanists who have been dealing with relatively small areas, while the wider conception is generally adopted by the writers of larger floras. The strongest evidence, however, in favour of treating *S. lantoscana* as a variety of *S. lingulata* is given by the writer of a local flora. Burnat, Flore des Alpes Maritimes, vol. iii. p. 260, divides *S. lingulata* into two varieties: *a. Bellardii*, Sternb., which is typical *S. lingulata*, Bellardi; and *β. lantoscana*, Engl. In addition to the localities quoted for these varieties Burnat gives under *S. lingulata* a long list of localities which he is unable to refer with certainty to either variety. He discusses the varieties as follows:—

"Boissier et Reuter (l.c.) ont caractérisé comme suit la var. *β*: 'Affinis *S. lingulatae*, Bell., vallis finitimae Tendensis incolae, ab ea differt virore minus griseo ad brunneum magis vergenti, foliis supra saepius convexis nec ut in *S. lingulata* sulcatis, foliis inferne multo minus longe attenuatis raroque et obsoleteque acutatis, crusta marginali tenuiori et ob paginae superioris convexitatem minus perspicua.' M. Engler (l.c.) s'est borné a la diagnose suivante: 'Folia brevia, inferne minus longe attenuata, apice non attenuata, crusta marginali tenuiori.' On sépare facilement les échantillons typiques de cette variété dont les feuilles subspatulées ou cunéiformes vers leur base ont environ 30 à 40 mm. long., parfois moins, sur 5 à 7 mm., parfois 8 mm. de larg., avec un sommet obtus, plus ou moins arrondi, rarement acutiuscule, tandis que les échantillons de la var. *a* ont des feuilles plus longues (jusqu'à 11 cm.),

moins larges, plus insensiblement élargies de la base au sommet qui est acutiuscule ou aigu. Mais entre ces formes extrêmes se recontrent de très nombreux intermédiaires douteux. Concernant la couleur du feuillage et la marge foliaire crustacée blanche, simulant des dentelures, nous ne trouvons nulle différence à noter. Sur les echantillons d'herbier il en est de même des caractères tirés de la disposition de la surface des feuilles. L'espèce varie du reste beaucoup : certains échantillons atteignent 50 et même 60 cm. de haut. avec une panicule de 30 à 35 cm. de long. sur 15 à 20 cm. de larg., tandis que certaines colonies montrent des tiges de 10 à 15 cm. avec une panicule étroite, de 5 à 6 cm. long. ; les pétales varient dans leur forme et longueur (jusqu'a 13 mm., parfois seulement 7 mm.) avec ou sans taches purpurines à leur base."

Examination of the material in the Kew herbarium confirms the result arrived at by Burnat and other authorities, that it is best to treat *S. lantoscana* and *S. australis* as varieties of *S. lingulata*. Owing to the large number of intermediate forms it is difficult to divide *S. lingulata* (in the broad sense) into varieties, and it is quite probable that different results might be arrived at from the study of different herbaria. As a basis for future work, however, it may be well to state the conclusions arrived at from the study of the Kew material, which includes a fine series of specimens forming part of the Churchill herbarium, which was bequeathed to Kew in 1906 (see *Kew Bull.* 1906, p. 387).

Four more or less distinct races may be recognized. The first (fig. 1) is typical *S. lingulata*, Bellardi (var. *Bellardii*, Sternberg). This is characterized by numerous long linear acute leaves, channelled on the upper surface, with a conspicuous calcareous incrustation. It appears to be all but confined to the Italian part of the Alpes Maritimes, and I have seen no specimens except from the neighbourhood of the Col di Tenda. It is represented in the Kew herbarium by a co-type, collected by Bellardi and distributed in Dickson's Collection of Dried Plants, No. 63, as *S. callosa*, Smith.

The second race corresponds to *S. australis*, Moric. (*S. lingulata*, var. *australis*, Engl.). It appears to vary considerably in the shape and size of the leaves according to situation, and is accordingly difficult to define. Well-grown plants from lower altitudes (fig. 2) have long broadly linear or linear-spathulate leaves, nearly flat on the upper surface. Specimens from higher altitudes have short broadly spathulate leaves, resembling those of *lantoscana*, but broader. The distribution of *S. australis* is as follows, according to the Kew material :—Mountains of Carrara and Massa, Pistojan Apennines, Monte Majella and Monte Morrone in Abruzzo, mountains near Latronico in Basilicata, and the mountains of Northern Sicily. It is probably this race of *S. lingulata* which has been discovered recently in Calabria (Longo in Ann. di Bot. Roma, vol. i. 1903, p. 98).

There are no Sardinian specimens of *S. lingulata* in the Kew herbarium but the figure given by Moris, Fl. Sard. t. 74, suggests that the Sardinian plant belongs to *S. australis*. This is the view taken by Nyman, Consp. Fl. Eur. p. 267, who gives the distribution of *S. australis* as Southern Italy, Sicily and Sardinia.

The third race (fig. 3), to which in the meantime it does not appear desirable to give a name, is represented by specimens gathered near the Col di Tenda, by Mr. Reginald Farrer, on the Aiguille de Menton by Hawker, and the Cime d'Anan, near Fontan, by Reverchon. It is characterised by elongated spathulate obtuse leaves with a fairly conspicuous incrustation.

The fourth race (fig. 4) is *S. lantoscana*, Boiss. et Reut. (*S. lingulata*, var. *lantoscana*, Engl.). It is distinguished by short spathulate very obtuse leaves, more or less convex on the upper surface, with a less conspicuous but more continuous incrustation. It occurs in the French departments of Hautes Alpes, Basses Alpes, Var and Alpes Maritimes, and it is probably this race which is quoted under typical *S. lingulata* from Bouches-du-Rhone by Rouy and Camus. From the localities given for typical *S. lingulata* by Rouy and Camus it is probable that their '*lingulata*' comes under *S. lantoscana* as here understood. *S. lantoscana* is represented in the Kew herbarium by a co-type, a specimen cultivated at Valleyres and communicated by Reuter to the late Mr. G. C. Churchill.

As some doubt has been cast on the identity of the plant cultivated at Kew and elsewhere in this country under the name *S. lingulata* var. *lantoscana*, it may be well to state that it appears to be correctly named. It is hoped that it may be possible to give more detailed descriptions of the races of *S. lingulata* when the living plants in the Kew collection come into flower. Kew is indebted for plants of *S. lingulata* (type and varieties) to Miss Willmott, Mr. Reginald Farrer, and Messrs. Heath and Sons, Cheltenham.

Explanation of Plates.

1. *Saxifraga lingulata*, Bellardi (typical).—Plant received from Miss Willmott in 1910.

2. *S. lingulata*, var. *australis*, Engl.—Plant received from Miss Willmott in 1910.

3. *S. lingulata*, var.—Plant received from Mr. R. Farrer in 1910, collected on rocks by the Col di Tenda.

4. *S. lingulata*, var. *lantoscana*, Engl.—Kew plant.

Figures slightly reduced from natural size.

XIII.—DIAGNOSES AFRICANAE: XL.

1211. **Loranthus (Rufescentes) nitidulus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 283, anglice [Loranthaceae-Eulorantheae]; affinis *L. discolori*, Engl., a quo foliis angustioribus supra nitidulis conspicue reticulatis differt.

Ramuli juniores pilis multiramosis ferrugineo-pubescentes, mox glabri. *Folia* anguste lanceolato-oblonga, apice obtusa, basi obtusa vel rotundata, 3·3–5·7 cm. longa, 1·2–1·7 cm. lata, coriacea, supra glabra, nitidula, subtus ferrugineo-tomentosa; petioli 1–1·4 cm. longi. *Umbellae* 4-florae, ferrugineo-pubescentes; pedunculus 2·5 mm. longus; pedicelli 1·5–2 mm. longi; bractea ovato-oblonga, 2 mm. longa,

suberecta, intus glabra. *Torus* 2 mm. longus. *Calyx* circiter 0·5 mm. longus, obscure lobatus, breviter ciliatus. *Corolla* 3·2–3·8 cm. longa, recta, ampulla basali carens, extus pilis stellatis ferrugineo-pubescens, radiis pilorum sursum deorsumque spectantibus ; tubus intus glandulosus ; lobi spathulati. *Antherae* oblongae, 1·5 mm. longae ; locelli 4 in quaque serie verticali. *Discus* parvus, ferrugineo-pilosus. *Stylus* glandulosus, superne metuliformis, collo 1·3 mm. longo ; stigma capitatum, 0·8 mm. diametro. *Bacca* ellipsoidea, 7 mm. longa, ferrugineo-pubescens.

Tropical Africa. Fernando Po : Fernando Po Mountain, 2100 m., *Mann*, 2346.

1212. **Loranthus (Rufescentes) erythraeus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 287, anglice [Loranthaceae-Euloranthеae] ; affinis *L. regulari*, Steud., a quo capitulis pedunculatis corollaque extus breviter tomentosa differt.

Ramuli primum pilis ramosis ferrugineo- vel fulvo-tomentosi, mox puberuli vel glabri. *Folia* ovata, ovato-oblonga vel elliptico-oblonga, apice obtusa vel rotundata, basi obtusa, leviter inaequalia, 6–17 cm. longa, 2·5–9 cm. lata, statu perjuveni tomentosa, mox glabra ; petioli 1–2·7 cm. longi. *Umbellae* axillares, fasciculatae, 2-florae, pilis ramosis ferrugineo-tomentosae ; pedunculus 2–2·5 mm. longus ; pedicelli 1·5–2 mm. longi ; bractea late ovata vel suborbicularis, 2·5–3 mm. longa, intus glabra. *Torus* 2·5 mm. longus. *Calyx* 1·5 mm. longus, breviter ciliatus. *Corolla* 4·5–5 cm. longa, unilateraliter fissa, basin versus vix ampliata, extus ferrugineo-tomentosa ; lobi erecti, spathulati, 1·7 mm. longi. *Filamenta* 1 cm. longa ; antherae auguste oblongae, 2·3–3 mm. longae ; locelli circiter 3 in quaque serie verticali. *Discus* parvus, pentagonus, glaber. *Stylus* glaber, superne metuliformis, collo 2·5 mm. longo ; stigma capitatum, 0·8 mm. diametro. *Bacca* ellipsoidea, 1–1·2 cm. longa, ferrugineo-pubescens, cupula apicali 1·5 mm. longa.

Tropical Africa. Eritrea : near Saganeiti, 2200 m., *Schweinfurth and Riva*, 785, 1800.

1213. **Loranthus (Rufescentes) Albizziae**, *De Wild.*, **var. Rogersii**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 289, anglice [Loranthaceae-Euloranthеae] ; a typo basi folii differt.

Folia elliptico-oblonga, basi obtusa vel cuneata, 7·5–10 cm. longa, 2·5–4·5 cm. lata, in sicco viridia. *Pedicelli* 1–1·3 mm. longi. *Antherae* 1·3 mm. longae.

Tropical Africa. North-West Rhodesia : near Ndola, *Rogers*, 8318.

1214. **Loranthus (Rufescentes) crassicaulis**, *Engl.* emend. *Sprague* in Dyer Fl. Trop. Afr. vol. vi. sect. 1, p. 291, anglice [Loranthaceae-Euloranthеae] ; ab *L. Wentzeliano*, Engl., et *L. berliniicola*, Engl., quibus affinis, corolla minore recedit.

Ramuli crassi, laeves, glabri, viridi-lutei, apicem versus 3–3·5 mm. diametro, nodis valde prominentibus. *Folia* alterna, ovata vel ovato-oblonga, apice obtusa vel rotundata, basi rotundata, 9–11·5 cm. longa, circiter 6 cm. lata, crasse coriacea, glabra, opaca, minute corrugata, margine cartilagineo undulato ; nervus medius supra leviter impressus, subtus valde prominens ; nervi laterales utrinque 8–9, patentes vel patuli, procul a margine anastomosantes, in

utraque facie prominuli; petioli crassi, basi ampliati, 7–12 mm. longi. *Umbellae* 4–5-florae; pedunculus sub fructu 2–3 mm. longus; pedicelli 0·5 mm. longi, dense ferrugineo-pilosi; bractea late ovata, valde concava, 1 mm. longa, extus dense ferrugineo-pilosa. *Torus* cupularis, fere 2 mm. longus, ferrugineo-pilosus. *Calyx* circiter 0·25 longus, subtruncatus. *Corolla* in alabastro 2·5–3 cm. longa, extus stellato-puberula, parte apicali ampliata ellipsoidea 2·5 mm. longa; tubus anguste infundibuliformis, intus glandulosus, ampulla basali ellipsoidea costata 2–2·5 mm. longa; lobi erecti, spathulati, parte apicali ovata acuta 2 mm. longa 1·3 mm. lata. *Antherae* elliptico-oblongae, vix 1 mm. longae. *Discus* in cavo situs, circiter 0·25 mm. altus, 5-lobus, intus minute ferrugineo-pilosus.

Tropical Africa. Congo State: Mayombe District; near Shinganga, *Dewèvre*, 278; Stanley Pool District; Kimuenza, *Gillet*, 2036.

1215. **Loranthus (Lepidoti) capitatus**, *Engl.*, var. **sessilis**, *Sprague* [Loranthaceae-Eulorantheae]; a typo umbellis sessilibus recedit.

Umbellae sessiles; pedicelli 1 mm. longi; bractea calycem superans, elliptico-oblonga vel ovato-oblonga, 3·5 mm. longa. *Calyx* irregulariter lobatus, 1·3–1·5 mm. longus, lobis longioribus posticis. *Corolla* 5 cm. longa; lobi 1·8 cm. longi. *Antherae* circiter 4 mm. longae. *Discus* intus dense ferrugineo-pilosus.—*L. incanus*, Schum. & Thonn., var. *sessilis*, Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 293, anglice.

Tropical Africa. Gaboon: Munda; Sibange Farm, *Soyaux*, 386.

Var. **albus**, *Sprague*; a typo corolla minore alba recedit.

Corolla usque ad 3·5 cm. longa, alba. *Antherae* 3–3·5 mm. longae.—*L. incanus*, Schum. & Thonn., var. *albus*, Sprague in Dyer Fl. Trop. Afr. vol. vi. sect. 1, p. 293, anglice.

Tropical Africa. Fernando Po, *Mann*, 275.

1216. **Loranthus (Cinerascentes) cistoides**, *Welw. ex Engl.* emend. *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 295, anglice [Loranthaceae-Eulorantheae]; bracteis foliaceis antherisque minoribus ab *L. glaucocarpo*, Peyr., distinctus.

Fruticulus multiramosus, 0·3–1 m. altus, in vivo albido-tomentosus, in sicco fulvus. *Folia* opposita, elliptica vel ovato-elliptica, apice obtusa vel rotundata, basi rotundata vel subcordata, 1·6–2·7 cm. longa, 1–1·5 cm. lata, pilis verticillatim ramosis utrinque tomentosa, tandem supra pubescentia; petioli 2–3 mm. longi. *Capitula* ramulos brevissimos axillares paria 1–2 foliorum gerentes terminantia, 3–4-flora, tomentosa; pedunculus circiter 5 mm. longus; bractea foliacea, late ovata, apice rotundata, 1·2 cm. longa. *Torus* cupularis, 1·5 mm. longus, pilis ramosis dense ferrugineo-villosus. *Calyx* circiter 0·17 mm. longus, truncatus. *Corolla* circiter 4·2 cm. longa, in alabastro apice quinquealata, viridi-lutea vel lutea, loborum parte suprema interdum roseo-purpurea, extus tomentosa; tubus intus glandulosus, ampulla basali ellipsoidea 3·5 mm. longa; lobi erecti, spathulati, 11 mm. longi, parte apicali ampliata ovata 3–3·5 mm. longa, 1·8–2 mm. lata marginibus tenuibus 0·5–0·7 mm. latis inclusis. *Filamenta* basi corollae laborum inserta, 8 mm. longa, involuta; antherae oblongae, 0·8 mm. longae, locellis 3 in quaque serie verticali. *Discus* 0·25 mm. altus, carnosus. *Stylus* sursum

haud incrassatus ; stigma capitatum, 0·5 mm. diametro. *Bacca* matura caerulea.—*Phragmanthera cistoides* Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 262. *Loranthus glaucocarpus*, Hiern in Cat. Afr. Pl. Welw. vol. ii. p. 928, partim, non Peyr.

Tropical Africa. Angola : Pungo Andongo, on *Citrus medica*, Linn., *Welwitsch*, 4848 ; on various trees, *Welwitsch*, 4847 ; *Mechow*, 90.

1217. **Loranthus (Involutiflori) rubroviridis**, *Oliv.*, var. **bechuanicus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 299, anglice [Loranthaceae–Eulorantheae]; a typo bracteis multo minoribus recedit.

Pedicelli 1·3 mm. longi ; bractea anguste oblonga, obtusa, 3–4 mm. longa, 0·8–1·3 mm. lata. *Corollae tubus* 1·5–2·3 mm. longus ; lobi circiter 1·7 cm. longi, apice leviter inflexi. *Filamenta* 2·5–3 mm. supra basin corollae loborum inserta, inferne per 8 mm. minute papillato-pilosa.

Tropical Africa. Bechuanaland : Eastern Bamanguato Territory ; between Nagatatollo and Henryspan, *Holub*.

1218. **Loranthus (Involutiflori) Bussei**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 299, anglice [Loranthaceae-Eulorantheae] ; affinis *L. Hildebrandtii*, Engl., a quo inflorescentia fere glabra recedit.

Ramuli nodosi, circiter 2·5 mm. diametro 30 cm. infra apicem, juventute puberuli, mox glabri, dense lenticellati. *Folia* opposita, lanceolata, apice obtusa, basi cuneata, 5–6·3 cm. longa, 1·6–2·3 cm. lata, coriacea, glabra ; nervi laterales obliqui, utrinque sat prominentes ; petioli 5–8 mm. longi. *Pedunculus* 2 mm. longus ; pedicelli 1·3–1·5 mm. longi, sparse puberuli ; bractea e basi cupulari lanceolata, cornu dorsali longo subulato, 1·5–2 mm. longa cornu excluso, 2·5–4 mm. longa cornu incluso, 0·8 mm. lata, ciliata, margine ventrali 0·3 mm. longo. *Torus* vix 1 mm. longus, glaber. *Calyx* 0·25–0·3 mm. longus, leviter lobatus, ciliatus. *Corolla* rubra, 1·3–1·4 cm. longa, extus sparse puberula, intus appendiculis quinque 1·5–2 mm. supra basin insertis, appendiculis corollae lobis alternantibus deflexis triangularibus pilosis ; lobi connati, intus infra insertionem staminum in marginibus et filamentorum parte adnata pilosi. *Filamenta* glabra, sursum ampliata ; antherae oblongo-lineares, 1·5 mm. longae, connectivo emarginato-bicuspidato. *Discus* circiter 0·25 mm. longus, vix lobatus.

Tropical Africa. German East Africa : Lindi District ; Mtauge, on the way to Lindi, *Busse*, 2462 ; Lindi, *Busse*, 2997 ; Namguru, *Busse*, 2949 ; Nondora, *Braun*, 1254.

1219. **Loranthus (Cupulati) opacus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 300, anglice [Loranthaceae-Eulorantheae] ; affinis *L. Dinklagei*, Engl., a quo foliis basi cuneatis, nervis supra haud obviis differt.

Ramuli juniores subteretes, viridi-cinerei, glabri, seniores cinerei grosse lenticellati ; internodia 2·5–7·5 cm. longa. *Folia* opposita, ovato-lanceolata, acute vel obtuse acuminata, basi cuneata, 5·5–11·5 cm. longa, 2–5 cm. lata, coriacea, glabra, opaca, in sicco subtilissime rugosula, haud reticulata, margine crispatulo ; nervi valde obliqui, in utroque latere 2, supra occulti, subtus prominentes ;

petioli 3–6 mm. longi, supra applanati. *Umbellae* axillares, fasciculatae, 3–4-florae ; pedunculus 1·5–2 mm. longus : pedicelli 1–1·5 mm. longi, in cavis cupularibus inserti ; bractea oblique cupularis vel oblique patelliformis, vix 1·5 mm. longa, minute ciliata, margine dorsali 1 mm. longo haud umbonato, margine ventrali 0·25–05 mm. longo. *Torus* calycecum campanulatus, 1·8 mm. longus. *Calyx* subtruncatus, minute ciliatus, vix 1 mm. longus. *Corolla* circiter 3·2 cm. longa, parte apicali ampliata in alabastro haud alata : tubus usque ad 9 mm. supra basin bilobus, intus glandulosus, ampulla suprabasali 0·5–0·8 supra basin sita ellipsoidea 3·5–4 mm. longa ; lobi elongato-spathulati, 1·6 cm. longi. *Filamenta* 1·2 cm. longa ; antherae oblongae, 1·3 mm. longae, leviter emarginato-biapiculatae. *Discus* 0·3 mm. altus, carnosus. *Stylus* collo 1·3 mm. longo ; stigma late ovoideo-fusiforme, 0·8–1 mm. longum.

Tropical Africa. Gaboon River, *Mann*.

1220. **Loranthus (Hirsuti) occultus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 308, anglice [Loranthaceae-Eulorantheae] ; affinis *L. Commiphorae*, Engl., a quo calyce multo minore extus dense villoso recedit.

Ramuli juniores mox glabrescentes, brunnei, adulti sulcati, cinerei. *Folia* obovato-oblanceolata, apice rotundata, basi cuneata, 1·1–5 cm. longa, 5–7·5 mm. lata, glabra ; petioli 4–5 mm. longi, albido - tomentelli. *Capitula* 4-flora, ramulos valde abbreviatos pulviniformes terminantia ; pedunculus 1·2–1·4 cm. longus, sulcatus, sparsissime stellato-puberulus ; bractea obovato-oblonga, apice rotundata, 1·6–1·8 cm. longa, 7–9 mm. lata, glabra. *Torus* calycecum cupularis, 1·8 mm. longus, extus dense albido-villosus, villis calycem 2 mm. superantibus. *Calyx* 0·5 mm. longus, villoso-ciliatus. *Corolla* extus in alabastro juveni albido-villosa, sub anthesi glabrescens strictura excepta, ultra 4·5 cm. longa ; tubus 1·2–1·3 cm. longus, ampulla basali ellipsoidea 4 mm. longa, strictura conspicua albido-pilosa ; lobi subspathulato-lineares, ultra 3·2 cm. longi, supra insertionem filamentorum reflexi. *Filamenta* 8 mm. supra basin corollae loborum inserta, circiter 1·6 cm. longa, superne ampliata ; antherae lineares, 5 mm. longae, biapiculatae. *Discus* 0·4 mm. altus. *Stigma* ellipsoideum, 0·5 mm. longum.

Tropical Africa. German East Africa : without precise locality, *Busse*, 1128.

1221. **Loranthus (Hirsuti) ngamicus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 310, anglice [Loranthaceae-Eulorantheae] ; foliis utrinque pubescentibus, capitulis ramulos abbreviatos axillares foliatos terminantibus bracteis haud foliaceis distincta.

Ramuli juniores pilis verticillatim ramosis tomentelli, seniores glabri, longitudinaliter rugosi. *Folia* opposita, elliptica vel elliptico-oblonga, apice rotundata, basi obtusa vel rotundata, 1·2–3·2 cm. longa, 8–14 mm. lata, coriacea, utrinque densiuscule pubescentia ; petioli 2–9 mm. longi. *Capitula* solitaria, ramulos valde abbreviatos axillares terminantia, 3–5-flora ; pedunculus 0·8–2·5 cm. longus, tomentellus ; bractea toro calycecum subaequalis vel brevior, ovato-oblonga, valde concava, 5–6 mm. longa, extus tomentella. *Torus* calycecum cupularis, 4·5–5 mm. longus, e basi densissime villosus, cingulo villorum 3·5–4 mm. longo. *Calyx*

subtruncatus vel leviter lobatus, quam torus sparsius villosus, longe ciliatus, 3–3·5 mm. longus. *Alabastra* subcylindrica. *Corolla* viridi-cremea, circiter 5 cm. longa, extus dense sericeo-villosa; tubus 1·8 cm. longus, inferne per 7 mm. levissime ampliatus; lobi lineares, sursum ampliati, 3·2–3·4 cm. longi, supra insertionem filamentorum reflexi. *Filamenta* 5–5·5 mm. supra basin corollae loborum inserta, 1·8 cm. longa; antherae lineares, 5–5·5 mm. longae, post dehiscentiam bicornutae. *Stigma* capitatum, 0·5 mm. diametro. *Bacca* ellipsoidea, 1·2–1·4 cm. longa, vivide rubra, hirsuta, cupula apicali 2·5–3 mm. longa. *L. Dregei*, var., N. E. Brown in Kew Bull. 1909, p. 135, non Eckl. & Zeyh.

Tropical Africa. Bechuanaland: Ntschokutsa, 900 m., *Seiner*, 1000 m. ser. ii. 124. Ngamiland: Kwebe Hills, *Mrs. Lugard*, 44; near Lake Ngami, on *Acacia* sp., *Lugard*, 30; on *Acacia detinens*, Burch., *Fleck*, 313 A.

1222. **Loranthus (Hirsuti) Dregei**, *Eckl. et Zeyh.*, var. **subcuneifolius**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 312, anglice [Loranthaceae-Eulorantheae]; a typo floribus majoribus, corolla densius vestita recedit.

Innovationes ferrugineo-tomentosae. *Folia* manifeste petiolata, obovato-oblonga vel elliptica, apice rotundata, basi cuneata vel obtusa, 3·2–12·5 cm. longa, 2–6·3 cm. lata, tenuiter coriacea, juventute grosse pubescentia praesertim subtus, tandem glabra; petioli 4–23 mm. longi. *Capitula* 2–4-flora; pedunculus 5–10 mm. longus, crassiusculus, tomentosus; bractea oblique spathaceo-cupularis, usque ad 4–5 mm. longa, 2·5–3 mm. alta. *Torus* calycecum 8–9 mm. longus vel infra, cingulo villorum 3–6 mm. longo. *Calyx* 5·5–7·5 mm. longus vel infra. *Corolla* 5–6·3 cm. longa, extus dense villoso-tomentosa; tubus circiter 1·8 cm. longus; lobi circiter 3·8 cm. longi. *Filamenta* 5·5–7 mm. supra basin corollae loborum inserta; antherae 8–8·5 mm. longae, biapiculatae. *Discus* quinquelobus lobis pilosis.——*L. Dregei*, forma *subcuneifolia*, Engl. in Engl. Jahrb. vol. xx. p. 104, excl. specim. nonnull. *L. Dregei*, forma *obtusifolia*, Engl. l.c. 105, partim; Engl. l.c. xxviii. p. 383, partim. *L. Dregei*, var. *subcurvifolia*, Engl. ex Schinz, Pl. Menyharth. p. 43, nomen, sphalm. *L. oblongifolius*, Steud. ex A. Rich. Tent. Fl. Abyss. vol. i. p. 342, non E. Mey. *L. hirsutiflorus*, Klotzsch in Peters, Reise Mossamb. Bot. p. 178.

Tropical Africa. Abyssinia: near Gapdia, *Schimper*, 768. German East Africa: Usambara; Gombelo, *Holst*, 2174; Pangani, *Stuhlmann*, 196; *Braun*, 1514; Dar-es-Salaam, *Holtz*, 395; Ruaha River, 500 m., on *Vitex* sp., *Goetze*, 421. Portuguese East Africa: Lower Zambesi; Lupata Mountains, between Sena and Tete, on *Cordyla africana*, Lour., *Peters*, 8; between Sena and Lupata, *Kirk*; Boruma, *Menyharth*, 509. Nyasaland: between Kondowe and Karonga, *Whyte*.

The floral measurements are from Schimper's and Whyte's specimens. The remaining specimens quoted have smaller flowers, and form a transition to typical *L. Dregei*.

Var. **kerenicus**, *Sprague*, l.c., anglice; forma foliorum a var. *subcuneifolio* distincta.

Folia ovato-oblonga vel ovata, rarius suborbicularia, apice rotundata vel obtusa, basi rotundata vel cordata, 4–7·5 cm. longa,

2·5–7 cm. lata, coriacea, juventute utrinque grosse pubescentia, in statu adulto supra glabra, subtus puberula ; petioli 8–15 mm. longi, tomentelli vel pubescentes. *Capitula* 2–4-flora ; pedunculus 5–16 mm. longus, crassus, tomentosus vel tomentellus ; bractea spathaceo-cupularis, circiter 5 mm. longa. *Torus* calycecum 6·5 mm. longus, cingulo villorum 3·5–4 mm. longo. *Calyx* subtruncatus, 4–4·5 mm. longus, extus sparse appresse villosus. *Corolla* 5 cm. longa, densissime villosa.——*L. Dregei*, forma *obtusifolia*, Engl. in Engl. Jahrb. xx. 105, partim.

Tropical Africa. Eritrea : Bogos, *Beccari*, 82 ; Keren, on *Combretum Hartmannianum*, Schweinf., *Hildebrandt*, 517. Gallabat : Matamma, *Schweinfurth*, 2193.

Var. **nyasicus**, *Sprague*, l.c. 313, anglice ; a var. *Sodenii*, Engl., cui proximus, foliis angustioribus subtus pube persistente, petiolis, calyce antheris longioribus recedit.

Folia elliptica, obovato-elliptica vel ovato-elliptica, apice rotundata, basi rotundata vel obtusa, rarius subcordata, 4–5·5 cm. longa, 2–3·5 cm. lata, tenuiter coriacea, juventute utrinque grosse dense pubescentia, in statu adulto supra glabra subtus pubescentia ; petioli 6–18 mm. longi. *Capitula* 3–4-flora ; pedunculus 2–3 mm. longus, tomentellus ; bractea spathaceo-cupularis, 1·5 mm. longa, limbo horizontali foliaceo 0·5–0·8 mm. infra apicem inserto late elliptico vel suborbiculari 2–3·5 mm. diametro utrinque tomentello saepius munita. *Torus* calycecum elongato-cupularis, circiter 5 mm. longus, superne glabrescens, cingulo basali villorum 4 mm. longo. *Calyx* subtruncatus, ciliatus, 3·5 mm. longus. *Corolla* circiter 5 cm. longa, extus parciuscule villosa ; tubus circiter 2 cm. longus, ampulla basali clavata 7–8 mm. longa inferne glabra superne longe pilosa ; lobi circiter 3 cm. longi. *Filamenta* 6–7 mm. supra basin corollae loborum inserta ; antherae 3·5 mm. longae. *Discus* 0·3 mm. altus, leviter 5-lobus, lobis parce pilosis.——*L. Dregei*, forma *obtusifolia*, Engl. in Engl. Jahrb. xxviii. 383, partim, non Engl. in Engl. Jahrb. xx. 105.

Tropical Africa. German East Africa : Uluguru Mountains, 1000 m., *Goetze*, 162 ; Kinga Mountains, *Goetze*, 1014. Nyasaland : Zomba, *Purves*, 154.

Var. **ovatus**, *Sprague*, l.c. 314, anglice ; foliis majoribus ovatis, floribus densissime villosis a var. *Sodenii*, Engl., recedit.

Folia late ovata, apice rotundata vel obtusissima, basi cordata vel subcordata, rarius rotundata, 3–9 cm. longa, 2·5–6 cm. lata, coriacea, juventute pilis verticillatim ramosis utrinque grossissime pubescentia, in statu adulto supra glabra, subtus grosse pubescentia ; petioli 5–12 mm. longi. *Pedunculus* 2–5 mm. longus, tomentosus. *Corolla* circiter 4·5 cm. longa, densissime ferrugineo-villosa.

Tropical Africa. German East Africa : Usambara ; Amani, *Braun*, 1092, 1970 ; *Warnecke*, 349 ; clearings in rain-forest, 900 m., on *Citrus Aurantium*, Linn., *Engler*, 707.

Var. **foliaceus**, *Sprague*, l.c., anglice ; affinis var. *subcuneifolio*, Sprague, et var. *kerenico*, Sprague, a quibus bracteis foliaceis distinguitur.

Folia subsessilia vel petiolata, elliptica vel ovata, apice rotundata vel obtusissima, basi rotundata vel subcordata, 4–7 cm. longa,

2–4 cm. lata, coriacea, juventute utrinque grossissime pubescentia, in statu adulto supra glabra, subtus pubescentia, petioli usque ad 8 mm. longi. *Capitula* 4–6-flora; pedunculus 1·2–3 cm. longus, grosse dense villosus; bractea foliacea vel subfoliacea, elliptica, 8–20 mm. longa, utrinque grossissime densissime pubescentia. *Corolla* 4·5–5 cm. longa.

Tropical Africa. Abyssinia: Harar, *Ellenbeck*, 797; Walenzo, 2000 m., *Ellenbeck*, 1303; Djebel Haquim, *Ellenbeck*. British East Africa: Kibwezi, 800–1000 m., *Scheffler*, 193, 346; Makindu River, *Kässner*, 575.

Var. **kilimanjaricus**, *Sprague*, l.c., anglice; inflorescentia sessili vel subsessili a var. *foliaceo*, Sprague, bracteis superne foliaceis a var. *Sodenii*, Engl., distinguitur.

Folia elliptica vel ovato-elliptica, apice rotundata, basi cordata, rarius rotundata, 3–5 cm. longa, 2–4 cm. lata, tenuiter coriacea, supra glabra, subtus grosse pubescentia; petioli 5–8 mm. longi. *Capitula* axillaria, solitaria, 4–6-flora, sessilia vel brevissime pedunculata; pedunculus usque ad 6 mm. longus, tomentellus; bractea inferne subspathacea, superne foliacea, suborbicularis, 4–8 mm. diametro, plana vel plus minus convexa vel concava, pilis verticillatim ramosis tomentosa. *Torus* calycecum elongato-cupularis, 4–5 mm. longus, cingulo basali villorum 3–4 mm. longo. *Calyx* 3·4 mm. longus. *Corolla* 4·5 cm. longa; tubus 1·5–1·6 cm. longus, ampulla basali clavata 5·5 mm. longa inferne glabrescente superne longe villosa; lobi 2·5–3 cm. longi. *Filamenta* 6·5 mm. supra basin corollae loborum inserta, superne ampliata, intus sulcata; antherae 2·8 mm. longae, connectivo emarginato-malleiformi. *Discus* 0·35 mm. altus, glaber.

Tropical Africa. German East Africa: Kilimanjaro; Marangu, on *Albizzia maranguensis*, Taub., *Volkens*, 1934.

Var. **longipes**, *Sprague*, l.c., anglice; foliis parvis tenuibus, pedunculo longo, bracteae limbo foliaceo horizontali vel reflexo distinctus.

Ramuli juvenes ferrugineo-tomentosi. *Folia* elliptico-oblonga vel obovato-oblonga, apice rotundata, subtruncata vel emarginata, basi obtusa, rotundata vel subcordata, 2–3 cm. longa, 8–14 mm. lata, chartacea vel tenuiter coriacea, juventute utrinque dense pubescentia; petioli 6–9 mm. longi. *Capitula* 4-flora; pedunculus gracilis, 2·5–3 mm. longus, dense pubescens; bractea limbo foliaceo horizontali vel reflexo utrinque dense pubescente. *Torus* calycecum fere 5 mm. longus. *Calyx* irregulariter dentatus, ciliatus, 4 mm. longus, extus fere glaber. *Corolla* circiter 4·2 cm. longa, viridi-lutea, inferne rubescens. *Antherae* 2·3–2·6 mm. longae, connectivo malleiformi.

Tropical Africa. German East Africa: Ssongea District; Kiva Kihingi, *Busse*, 764.

1223. **Loranthus (Hirsuti) nyikensis**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 315, anglice [Loranthaceae-Eulorantheae]; affinis *L. Dregei*, var. *foliaceo*, Sprague, a quo ramis brevibus flexuosis, internodiis brevioribus, foliis minoribus minus coriaceis, bracteis majoribus, pilis corollae magis appressis.

Frutex multiramosus, ramulis junioribus pubescentibus vel tomentellis. *Rami* breves, flexuosi, glabri, subtiliter rugosi, inconspicue lenticellati; internodia 1·2–3·7 cm. longa. *Folia* opposita, sessilia vel breviter petiolata, elliptica, elliptico-oblonga vel ovato-elliptica, apice rotundata, basi rotundata vel subcordata, 1·8–3·4 cm. longa, 1·2–2·5 cm. lata, tenuiter coriacea, grosse stellato-pubescentia praesertim subtus, supra tandem plus minusve glabrescentia; petioli usque ad 6 mm. longi. *Capitula* solitaria, axillaria vel ramulos valde contractos foliatos axillares terminantia, 3–4-flora; pedunculus 6–16 mm. longus, tomentellus; bractea foliacea, late ovata, 9–14 mm. longa, 6–11 mm. lata, utrinque tomentella. *Torus* calycecum cupularis, 1·8 mm. longus, inferne cingulo denso villorum circiter 2·5 mm. longo, superne sparse breviter villosus. *Calyx* subtruncatus, ciliatus, 3–3·4 mm. longus. *Corolla* 4·5 cm. longa; tubus 1·4–1·5 cm. longus, ampulla basali clavata 5 mm. longa inferne subglabra superne dense villosa; lobi 2·5–3·2 cm. longi. *Filamenta* 5·5–6 mm. supra basin corollae loborum inserta, 1·7–1·8 cm. longa; antherae lineares, 4 mm. longae, biapiculatae. *Discus* 5-lobus, 0·5 mm. altus, carnosus.

Tropical Africa. Nyasaland: Nyika Plateau, *McClounie*, 111.

1224. **Loranthus (Hirsuti) alveatus**, *Sprague* in Dyer Fl. Trop. Afr. vol. vi. sect. 1, p. 315, anglice [Loranthaceae-Eulorantheae]; foliis obovato-oblongis basi cuneatis vel obtusis glabris, bracteis foliaceis distinctus.

Ramuli juniores tomentelli vel pubescentes, seniores glabri, subcinerei. *Folia* opposita, obovato-oblonga, apice rotundata, basi cuneata vel obtusa, 2·5–3·8 cm. longa, 1·2–1·9 cm. lata, coriacea, glabra; petioli 3–4 mm. longi. *Capitula* solitaria, axillaria, 4-flora; pedunculus 1–1·4 cm. longus, pubescens; bractea foliacea, recurvato-alveata, 9–10 mm. longa, stellato-pubescens. *Torus* calycecum cupularis, 4–4·2 mm. longus, inferne cingulo villorum 2–3 mm. longo, superne sparsius villosus. *Calyx* subtruncatus, 2·5–3 mm. longus. *Corolla* circiter 4 cm. longus; tubus circiter 1·3 cm. longus, ampulla basali obovoideo-oblonga 4·5 mm. longa inferne glabrescente superne longe dense villosa, constrictione ob indumentum inconspicua; lobi subspathulato-lineares, ultra 2·5 cm. longi. *Filamenta* 5·5 mm. supra basin corollae loborum inserta, circiter 1·5 cm. longa, superne ampliata intus subtiliter sulcata; antherae lineares, 3–3·4 mm. longae, connectivo malleiformi. *Discus* 0·25 mm. altus, carnosus, glaber. —*L. Dregei*, forma *subcuneifolia*, Engl. in Engl. Jahrb. vol. xx. p. 104, partim.

Tropical Africa. German East Africa: Usambara; Doda, *Holst*, 2946.

1225. **Loranthus (Hirsuti) lindensis**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 316, anglice [Loranthaceae-Eulorantheae]; affinis *L. alveato*, Sprague, a quo foliis ovato-ellipticis vel ellipticis basi cordatis vel rotundatis recedit.

Ramuli longi, recti, penduli, graciles, vix ultra 2 mm. diametro 30 cm. infra apicem, primum ferrugineo-pubescentes, demum stellato-puberuli, tandem glabri, subtiliter densiuscule lenticellati; nodi satis conspicui; internodia 1·8–4 cm. longa. *Folia* opposita, breviter petiolata, elliptica vel ovato-elliptica, apice rotundata, basi

cordata vel subcordata, 3–5·5 cm. longa, 1·8–4 cm. lata, tenuiter coriacea, glabra, subglaucescentia ; petioli 3–5 (rarius usque ad 9) mm. longi, pubescentes. *Capitula* axillaria, solitaria, 4-flora ; pedunculus 1·8–2·5 cm. longus, satis gracilis, glaber vel stellato-puberula ; bractea foliacea, elliptica, 1·2–2·5 cm. longa, 0·3–1·6 cm. lata, utrinque glabra. *Torus* calycecum tubularis, 5·5–6 mm. longus, cingulo basali villorum circiter 2 mm. longo. *Calyx* subtruncatus vel irregulariter lobatus, 4·5 mm. longus, extus sparse pilosus, ciliatus. *Corolla* 5·5 cm. longa, extus dense villosa parte basali 4 mm. longa excepta, aurantiaca lobis viridibus : tubus 1·8–2 cm. longus ; lobi 3·8 cm. longi, lineares, superne per 7 mm. linearilanceolati. *Filamenta* 7·5 mm. supra basin corollae loborum inserta ; antherae 4 mm. longae. *Discus* non lobatus, 0·35 mm. altus, glaber. *Bacca* oblongo-ellipsoidea, 8 mm. longa, glabra, intense rubra, cupula apicali 3·5 mm. longa.

Tropical Africa. German East Africa : Lindi, on *Terminalia Catappa*, Linn., *Busse*, 3005.

1226. **Loranthus (Infundibuliformes) falcifolius**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 317, anglice [Loranthaceae-Eulorantheae] ; foliis falcatis vel acinaciformibus, filamentis dente carentibus distinguitur.

Rami nodosi, grosse rugosi, 3–8 mm. diametro ; ramuli juvenes subangulati, compressiusculi, glabri, viridi-cinerei. *Folia* saepius alterna, falcata vel acinaciformia, apice rotundata, interdum apiculata, sensim in basin angustata, 6·5–9·5 cm. longa, 11–14 mm. lata, coriacea, glabra, 5–7-nervia, nervis prope basin ortis supra magis prominentibus ; petioli 4–8 mm. longi. *Umbellae* axillares, solitariae, 3-florae ; pedunculus circiter 2 mm. longus ; pedicelli 1·5 mm. longi ; bractea oblique cupularis, crasse carinata, margine dorsali 2 mm. longo, ventrali 1·3 mm. longo. *Torus* calycecum tubularis, prope medium levissime constrictus, 7 mm. longus, extus glaber. *Calyx* 4·5–5 mm. longus, subtruncatus. *Corolla* rubro-aurantiaca, 6 cm. longa, in alabastro acute pentagona, supra medium latior ; tubus fere 5 cm. longus, haud ad medium unilateraliter fissus ; lobi erecti, linares, 11 mm. longi, 1·3–1·5 mm. lati. *Filamenta* circa basin corollae loborum inserta, sursum leviter angustata, 5·5–6·5 mm. longa, deflexa ; antherae lineares, 4 mm. longae, 0·8 mm. latae. *Discus* leviter lobatus, circiter 0·5 mm. altus. *Stylus* in basin ampliatus, superne leviter incrassatus.

Tropical Africa. Angola : Kaconda, on *Caesalpinieae*, *Gossweiler*, 1701.

1227. **Loranthus (Infundibuliformes) deltae**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 319, anglice [Loranthaceae-Eulorantheae] : affinis *L. Kayseri*, Engl., a quo corollae lobis reflexis recedit.

Ramuli juniores papillati, seniores subcinerei, glabri. *Folia* opposita vel alterna, obovata, elliptica vel elliptico-oblonga, apice rotundata, basi obtusa vel cuneata, leviter obliqua, 3–5·5 cm. longa, 1·6–3·8 cm. lata, coriacea, glabra, basi 5–7-nervia ; petioli 3–8 mm. longi. *Umbellae* axillares, subsessiles, 3-florae, solitariae vel fasciculatae ; pedicelli 0·8 mm. longi ; bractea cupularis, irregulariter truncata, 2 mm. longa, extus dense glanduloso-papillata.

Torus calycecum breviter tubularis, 2·8 mm. longus. *Calyx* 1·3–1·5 mm. longus, sparsissime glanduloso-ciliatus. *Corolla* rosea, circiter 3·7 cm. longa, extus glanduloso-papillata, praesertim superne; tubus cylindrico-infundibuliformis, unilateraliter fissus, intus glandulosus; lobi a basi sursum discedentes, linearispathulati, 10–11 mm. longi, demum reflexi. *Filamenta* 5 mm. longa, deflexa; antherae lineares, 3·4–3·6 mm. longae. *Discus* leviter lobatus, 0·35 mm. altus, carnosus. *Stylus* sursum haud incrassatus, pentagonus, glaber; stigma capitatum, 0·8 mm. diametro. *Bacca* oblongo-ellipsoidea, 9 mm. longa, cupula apicali 1 mm. longa.

Tropical Africa. Portuguese East Africa: Zambesi Delta; at the mouths of the Luabo and Kongone Rivers, on *Avicennia* sp., *Kirk*.

1228. **Loranthus (Infundibuliformes) pennatulus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 324, anglice [Loranthaceae-Eulorantheae]; affinis *L. brunneo*, Engl., a quo nervatione foliorum plus minusve pinnata recedit.

Ramuli juniores subangulati, glabri, seniores teretes, subcinerei, dense lenticellati. *Folia* subternata vel alterna, ovato-elliptica vel elliptica, apice obtusa vel rotundata, basi rotundata vel obtusa, 4·5–7 cm. longa, 2·5–5 cm. lata, coriacea, glabra; nervi rubri (*Scheffler*), laterales utrinque 2–3, supra et subtus prominuli; petioli 2–5 mm. longi. *Flores* axillares, sessiles, glomerati; bractea oblique cupularis, minute ciliata, basi solida 0·5–0·8 mm. longa, margine dorsali 1·5–1·8 mm. longo truncato vel leviter emarginato 0·5 mm. infra apicem umbonato, margine ventrali 0·8 mm. longo. *Torus* calycecum cylindrico-lageniformis, 3·4–3·6 mm. longus. *Calyx* quinquedentatus, 2 mm. longus. *Corolla* rubro-purpurea, 4·5–5 cm. longa, parte basali angusta 1·5–2 mm. longa, ampulla suprabasali ellipsoidea 5 mm. longa; tubus 1·2–1·4 cm. unilateraliter fissus; lobi erecti, lineares, sursum et in basin ampliati, 9·5 mm. longi. *Filamenta* 0·8 mm. supra basin corollae loborum inserta, 5·5 mm. longa, sursum angustata, involuta; antherae lineares, leviter emarginatae, 2·3 mm. longae. *Discus* acute quinquelobus, 0·8 mm. longus. *Stigma* subglobosum, 0·8 mm. diametro.

Tropical Africa. Uganda: Lamuru, 3000 m., *Scheffler*, 308. British East Africa, *C. F. Elliott*, 23.

1229. **Loranthus (Remoti) remotus**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 327, anglice [Loranthaceae-Eulorantheae]; species perdistincta indumento sectionis *Cinerascentium*, a qua corollae lobis induplicatis, filamentis erectis, antheris haud transverse septatis differt.

Rami crassi, 4·5 mm. diametro 30 cm. infra apicem, leviter flexuosi, nodosi, primum pilis verticillatim ramosis dense albido-tomentosi, demum pubescentes vel puberuli, tandem glabri, subochracei vel cinerei; internodia 1·3–3·8 cm. longa. *Folia* opposita, subopposita vel alterna, breviter petiolata, obovata vel obovato-oblonga, apice rotundata, basi cuneata, 5–7 cm. longa, 2·5–3·8 cm. lata, crasse coriacea, juvenilia pilis verticillatim ramosis dense albido-tomentosa, adulta glabrescentia, penninervia; nervi supra leviter prominuli, subtus vix visi, laterales utrinque circiter 4,

obliqui, levissime curvati ; venulae haud obviae ; petioli 4–6 mm. longi. *Umbellae* axillares, solitariae vel geminatae, pilis verticillatim ramosis ubique dense albido-tomentosae, 5–6-florae ; pedunculus 3–5 mm. longus, crassus ; pedicelli 2–3 mm. longi ; bractea e basi circulari unilateraliter evoluta, anguste oblonga vel oblongo-linearis, in basin leviter ampliata, circiter 4 mm. longa, concava, intus glabra, marginibus inflexis. *Torus* calycecum cupularis, 2·3 mm. longus. *Calyx* truncatus, circiter 0·25 mm. longus. *Corolla* cylindrico-infundibuliformis, 4·5 cm. longa ; tubus in basin leviter ampliatus, ultra medium unilateraliter fissus ; lobi erecti, oblongo-lineares, valde concavi, in alabastro induplicati, 9 mm. longi. *Filamenta* erecta (*Kirk*, icon.), circiter 2·5 mm. longa, infra antheram valde incrassata et obscuriora ; antherae lineares, 3·5 mm. longae, connectivo 0·17 mm. supra loculos producto. *Discus* in cavo situs, pentagonus, breviter lobatus, 0·25 mm. altus, pilis ramosis dense albido-pilosus. *Stylus* sursum sensim angustatus, inferne crassus, pilis ramosis dense pilosus, superne gracilis, glaber ; stigma ellipsoideum, levissime bilobum, 0·8 mm. longum.

Tropical Africa. Portuguese East Africa : Shupanga, *Kirk*, 40.

1230. **Loranthus (Rigidiflori) fragilis,** *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 329, anglice [Loranthaceae-Eulorantheae] ; affinis *L. Welwitschii*, Engl., a quo ramis valde nodosis et foliis obovatis recedit.

Rami fragiles, subteretes, in sicco cinereo-brunnei, glabri, valde nodosi, circiter 3 mm. diametro 30 cm. infra apicem ; internodia 4–12 mm. longa. *Folia* opposita, subopposita vel alterna, obovata, apice rotundata, basi cuneata, 1·2–2·5 cm. longa, 0·7–1·2 cm. lata, carnosa, glauco-viridia (*Gossweiler*), in sicco rigide coriacea ; nervi laterales vix obvii ; nervus medius utrinque leviter prominulus ; petioli 1–2 mm. longi. *Umbellae* axillares, ut videtur fasciculatae, 3–4-florae ; pedunculus 3–3·5 mm. longus ; pedicelli 2 mm. longi ; bractea e basi patelliformi ovata, rotundata vel subemarginata, valde concava, crasse carinata, glanduloso-ciliata, margine dorsali 1–1·3 mm. longo, margine ventrali 0·25–0·4 mm. longo. *Torus* calycecum anguste campanulatus, 2·5 mm. longus. *Calyx* patulus, truncatus, glanduloso-ciliatus, 0·8 mm. longus. *Corolla* circiter 1·8 cm. longa, viridis lobis sulphureis exceptis ; tubus 4·5 mm. longus, circa medium constrictus usque ad 1·5 mm. supra basin unilateraliter fissus ; lobi suberecti, 1·3 cm. longi, subspathulato-lineares, superne leviter incurvati. *Filamenta* basi corollae loborum inserta, 7 mm. longa, sursum leviter angustata, involuta ; antherae lineares, 5·5 mm. longae, connectivo 0·4 mm. lato 0·25 mm. ultra loculos producto. *Discus* breviter lobatus, 0·4 mm. altus. *Stylus* superne haud incrassatus ; stigma subglobosum, 0·8 mm. diametro.

Tropical Africa. Angola : near Benguella, *Gossweiler*, 1683.

1231. **Loranthus (Longiflori) unyorensis,** *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 330, anglice [Loranthaceae-Eulorantheae] ; foliis basi obtusis vel rotundatis, floribus racemose dispositis a *L. platyphyllo*, Hochst., distinctus.

Ramuli juniores superne leviter compressi, nigrescentes, inferue fulvi, subtiliter lenticellati, seniores subteretes, 3·5 mm. diametro 22 cm. infra apicem, pallide cinereo-brunnei, subtiliter lenticellati; internodia 3·8–6·3 cm. longa. *Folia* opposita vel subopposita, lanceolata, acute acuminata, basi obtusa vel rotundata, 9–11 cm. longa, 3·2–4·4 cm. lata, crasse coriacea, glabra, penninervia; nervi laterales patuli, utrinque circiter 8, supra prominuli, subtus vix visi; nervus medius prominens, praesertim subtus; petioli 1–1·6 cm. longi. *Racemi* axillares, solitarii vel fasciculati, brevissimi, valde contracti, umbelliformes, 8–13-flori; pedunculus 5–9 mm. longus, clavatus, in basin ampliatus; pedicelli in parte superiore pedunculi 3–5 mm. longa conferti; bractea ovato-cupularis, margine dorsali rotundato 1·5–1·8 mm. longo, margine ventrali circiter 0·5 mm. longo. *Torus* calycecum campanulatus, 2·8 mm. longus, glaber. *Calyx* truncatus, 0·8–1 mm. longus, annulo intramarginali 0·2 mm. alto. *Corolla* (evoluta non visa) in alabastro circiter 3·3 cm. longa, rosea apice luteo (*Bagshawe*), circa medium latior quam alibi, sursum in apicem leviter incurvum sensim angustata, deorsum angustata, versus basin leviter ampliata; tubus intus glandulosus; lobi lineares, in alabastro circiter 1 cm. longi. *Filamenta* sursum leviter sensim angustata, in alabastro circiter 5·5 mm. longa; antherae oblongo-lineares, in alabastro 2·3 mm. longae, connectivo ultra thecas leviter producto. *Discus* vix lobatus, 0·4 mm. altus. *Stylus* superne haud metuliformis; stigma subglobosum, 0·8–1 mm. diametro. *Bacca* obovoidea vel oblongo-ellipsoidea, 7–8 mm. longa, cupula apicali 1 mm. longa.

Tropical Africa. Uganda: Unyoro; above Kibero, 900 m., on *Ficus* sp., *Bagshawe*, 911.

1232. **Loranthus** (Longicalyculati) **Stuhlmannii**, *Engl.*, var. **somalensis**, *Engl. ex Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 331, anglice [Loranthaceae-Eulorantheae]; foliis oblanceolatis apice rotundatis a typo recedit.

Rami juventute puberuli, mox glabrescentes; internodia 6–14 mm. longa. *Folia* oblanceolata, apice rotundata, in basin sensim angustata, 3–5·7 cm. longa, 0·7–1·6 cm. lata, paullo supra basin trinervia (vel quinquenervia); nervi supra prominuli, subtus minus obvii; petioli 1–4 mm. longi. *Pedicelli* 1 mm. longi. *Torus* calycecum 5 mm. longus. *Corolla* in alabastro 1·6 cm. longa; tubus 4 mm. longus; lobi 1·2 cm. longi. *Filamenta* 9·5 mm. longa, valde applanata; antherae 2·8 mm. longae.

Tropical Africa. Somaliland: Webi Abdallah, *Keller*, 218.

1233 **Loranthus** (Coriaceifolii) **glabratus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 335, anglice [Loranthaceae-Eulorantheae]; affinis *L. Fischeri*, Engl., a quo filamento dentigero recedit.

Ramuli juventute subtetragoni, brunnei, glabri, demum subteretes costis quatuor longitudinalibus, fulvo-cinerei, subtilissime lenticellati; internodia 1·2–3·2 cm. longa. *Folia* alterna, obovato-elliptica vel elliptica, apice rotundata, basi obtusa vel cuneata, 2·5–6·3 cm. longa, 1·2–3·8 cm. lata, rigide coriacea, glabra, opaca, margine irregulariter undulata, e basi 3–5-nervia; nervi supra prominentes, subtus prominuli; petioli 3–7 mm. longi. *Umbellae* axillares, 4-florae; pedunculus 2·5–3 mm. longus; pedicelli 1·5 mm.

longi ; bractea oblique cupularis, glabra, margine dorsali crasse carinato 1·8 mm. longo emarginato, margine ventrali 1·3 mm. longo. *Torus* calycecum cylindricus, 4–4·5 mm. longus. *Calyx* truncatus, 2·8 mm. longus. *Corolla* 1·6–1·7 cm. longa, in alabastro ad insertionem staminum ampliata ; tubus cylindricus, 3–3·5 mm. longus, exappendiculatus ; lobi infra medium reflexi, lineares, ad insertionem staminum valde ampliati, circiter 1·4 cm. longi, 0·5–0·7 mm. lati, parte ampliata elliptica 1 mm. lata. *Filamenta* 2 mm. supra basin corollae loborum inserta, involuta, sursum leviter angustata, 5·5 mm. longa, quadrangularia, angulis rigide serratis, dente 0·13 mm. longo ; antherae lineares, 5·5 mm. longae. *Discus* leviter lobatus, 0·35 mm. altus.—*L. Fischeri*, var. *glabratus*, Engl. in Engl. Jahrb. vol. xl. p. 528.

Tropical Africa. Galla Highlands : Abu-el-Kasin, *Ellenbeck* ; Luku, 1500 m., *Ellenbeck*, 1229.

1234. **Loranthus** (**Obtectiflori**) **longipes**, *Baker et Sprague* in Dyer Fl. Trop. Afr. vol. vi. sect. 1, p. 341, anglice [Loranthaceae-Eulorantheae] ; ramulis non tetragonis, bractea calycem aequante vel leviter tantum superante distinctus.

Rami juniores graciles, nigrescentes, versus apicem leviter compressi, mox teretes, adulti teretes, cinerei, minute lenticellati, 3·6 mm. diametro 30 cm. infra apicem ; internodia 1·9–5 cm. longa. *Folia* opposita, ovato-elliptica, apice obtusa vel rotundata, basi subcordata, rotundata vel obtusa, 6·3–8·3 cm. longa, 3·2–6·3 cm. lata, tenuiter coriacea, glabra ; nervi laterales utrinque 4–5, patuli, procul a margine anastomosantes, utrinque prominuli ; petioli 4–6 mm. longi. *Umbellae* axillares, fasciculatae, 10–14-florae ; pedunculus gracilis, 1·2–3·8 cm. longus ; pedicelli 3–4·5 mm. longi ; bractea breviter late cymbiformis, 2·3–2·6 mm. longa, rotundata vel retusa, sparse ciliolata, crassissime carinata, carina supra cornuta, cornu usque ad 0·35–0·5 mm. longo, margine ventrali patelliformi 0·35 mm. longo. *Torus* calycecum cupularis, 1·8–2 mm. longus. *Calyx* subtruncatus, 0·5–0·7 mm. longus, annulo intramarginali 0·2 mm. alto. *Corolla* 3·8–4·2 cm. longa, in alabastro parte apicali ampliata oblongo-ellipsoidea pentagona ; tubus roseo-ruber lineis intensioribus notatus, inferne leviter ampliatus tantum ; lobi spathulati, 11 mm. longi. *Filamenta* sursum angustata, 8 mm. longa, dente 0·7 mm. longo ; antherae oblongae, 2·3 mm. longae, connectivo ultra loculos paullo producto. *Discus* haud distincte lobatus, 0·4 mm. altus.

Tropical Africa. German East Africa : Dar-es-Salaam, *Kirk*.

1235. **Loranthus** (**Purpureiflori**) **Eylesii**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 343, anglice [Loranthaceae-Eulorantheae] ; foliis ellipticis vel ovato-ellipticis crasse coriaceis, petiolis glabris, calyce ferrugineo-ciliato distinctus.

Rami crassi, 5·2–5·7 mm. diametro, brunneoli, grossiuscule densiuscule lenticellati ; internodia 2–3·2 cm. longa. *Folia* opposita vel subopposita, late elliptica vel ovato-elliptica, apice rotundata, e parte inferiore rotundata abrupte in basin cuneata, 5–9 cm. longa, 3·2–6·8 cm. lata, crasse coriacea, glabra, subglauca, nervis venisque prominentibus ; nervi laterales irregulares, utrinque 2–3, superiores obliqui, fere in apicem procurrentes ; petioli crassi, 4–7 mm. longi.

Capitula axillaria, sessilia, glomerata, 2-flora ; receptaculum 2·5–3 mm. longum, cavis obliquissime sitis patelliformibus ; bractea obliquissime cupularis, 2·5–2·8 mm. longa, plus minusve bilabiata, ciliata, margine dorsali 1·8–2 mm. longo, margine ventrali circiter 1 mm. longo. *Torus* calycecum anguste campanulatus, circa medium leviter constrictus, 4·5–5 mm. longus. *Calyx* irregulariter lobatus, ferrugineo-ciliatus, 2·3–2·6 mm. longus. *Corolla* rubro-aurantiaca (fide *Eyles*), circiter 4·5 cm. longa ; tubus ampulla basali ellipsoideo-oblonga 6–7 mm. longa, supra ampullam anguste infundibuliformis, unilateraliter fissus ; lobi erecti, lineares, 9 mm. longi. *Filamenta* 1 mm. supra basin corollae loborum inserta, sursum sensim angustata, 4 mm. longa, deflexa, dente 0·7 mm. longo ; antherae lineares, 2·5 mm. longae. *Discus* distinctissime lobatus, 0·8 mm. altus. *Stylus* superne metuliformis, collo circiter 3 mm. longo.

Tropical Africa. Rhodesia : Bulawayo, 1350 m., *Eyles*, 1194.

1236. **Loranthus (Constrictiflori) Farmari**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 345, anglice [Loranthaceae-Euloranthеae] ; affinis *L. ogowensi*, Engl., a quo pedunculi cavo apicali differt.

Rami graciles, circiter 2·5 mm. diametro 30 cm. infra apicem, teretes, laeves, cinerei ; internodia 4·5–10 cm. longa. *Folia* opposita vel subopposita, ovata vel lanceolata, apice obtusa, interdum minute apiculata, basi obtusa vel rotundata, 6·5–9 cm. longa, 2·5–4·2 cm. lata, tenuiter coriacea, glabra, nervis venisque utrinque prominentibus ; nervi laterales utrinque 4–6, obliqui, procul a margine anastomosantes ; petioli 5–9 mm. longi. *Umbellae* axillares, solitariae, circiter 9-florae ; pedunculus 2–4 mm. longus, superne convexo-discoideus, circiter 2·8 mm. diametro, cavo apicali profundo, floribus in circulum dispositis ; pedicelli 1·5–1·8 mm. longi ; bractea oblique ovato-patelliformis, sparse ciliolata, margine dorsali 1·3 mm. longo, margine ventrali 0·5–0·7 mm. longo. *Torus* calycecum campanulatus vel cupularis, 2·5–3 mm. longus. *Calyx* subtruncatus, ciliolatus, 1·3 mm. longus. *Corolla* coccinea (teste *Farmar*), 4·2 cm. longa, in alabastro parte ampliata apicali ellipsoidea depresse truncata dentibus 5 divergentibus triangularibus coronata ; tubus ampulla basali ellipsoidea 4·5 mm. longa, supra ampullam infundibuliformis, unilateraliter fissus ; lobi reflexi, spathulato-lineares, parte ampliata 3 mm. longa 1·3 mm. lata apice valde incrassata dorsaliter in appendicem triangularem 0·7 mm. longam producta. *Filamenta* 7 mm. infra apicem corollae loborum inserta, per circulum involuta, sursum sensim angustata, 4 mm. longa, dente 0·7 mm. longo ; antherae anguste oblongae, 1·8 mm. longae. *Discus* vix lobatus, 0·35 mm. altus. *Stylus* superne conspicue metuliformis, parte incrassata 4·5–5 mm. longa, collo 1–1·3 mm. longo sursum in basin stigmatis ellipsoidei sensim incrassato.

Tropical Africa. Gold Coast, *Farmar*, 503.

1237. **Loranthus (Constrictiflori) guttatus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 350, anglice [Loranthaceae-Euloranthеae] ; corolla extus glabra conspicue guttata, parte apicali ampliata nec corniculata nec truncata nec alata distincta.

Rami crassi, flexuosi, 5–10 mm. diametro, brunnei, sat subtiliter densiuscule lenticellati, lenticellis horizontaliter elongatis; ramuli 2–3 mm. diametro, pallide brunnei; internodia 1·3–3·8 cm. longa. *Folia* opposita vel subopposita, lanceolata, apice obtusa, basi obtusa vel cuneata, 9–12·5 cm. longa, 2–3·8 cm. lata, crasse coriacea, glabra, penninervia; nervi laterales utrinque 4–5, obliquissimi, supra prominuli, subtus vix visi, procul a margine anastomosantibus; petioli 6–12 mm. longi. *Umbellae* axillares et ex ligno annotino ortae, solitariae vel fasciculatae, 4-florae; pedunculus 3–3·5 mm. longus, cavis cupularibus 0·8 mm. profundis; pedicelli 1–1·5 mm. longi; bracteae ovato-cupularis, margine dorsali 1·5–1·8 mm. longo truncato vel obtuso, margine ventrali 0·8–0·9 mm. longo. *Torus* calycecum campanulatus, late apertus, 3·4–3·6 mm. longus, pallide viridis. *Calyx* truncatus. 1·8 mm. longus. *Corolla* circiter 4 cm. longa, rubella, dense albo-guttata, extus glabra, in alabastro parte ampliata apicali oblongo-ellipsoidea 5-costata 4 mm. longa; tubus 1·2–1·4 cm. deorsum unilateraliter fissus, ampulla basali obovoideo-globosa 4 mm. longa circiter 3 mm. diametro; lobi intense rubri, reflexi, subspathulati, 6·5–7 mm. longi, circiter 1·5 mm. lati. *Filamenta* 1–1·5 mm. infra basin corollae loborum inserta, deflexa, 5 mm. longa, dente 0·7 mm. longo; antherae oblongo-lineares, 2·8 mm. longae. *Discus* pentagonus, 0·25 mm. altus. *Stylus* superne metuliformis, parte incrassata intense rubra 6 mm. longa, collo 2·5 longo.

Tropical Africa. North-west Rhodesia: near Bwana Mcubwa, 1350 m., *Rogers*, 8320. Mashonaland: Mazoe District, *Eyles*, 369.

1238. **Loranthus** (**Constrictiflori**) **constrictiflorus**, *Engl.*, var. **karaguensis**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 352, anglice [Loranthaceae-Eulorantheae]; corolla in alabastro truncata a typo differt.

Tropical Africa. German East Africa: Karagwe; Bukoba, *Stuhlmann*, 4019a; Mtagata, *Stuhlmann*, 3190.

1239. **Loranthus** (**Constrictiflori**) **globiferus**, *A. Rich.*, var. **bornuensis**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 352, anglice [Loranthaceae-Eulorantheae]; foliis plerumque elliptico-oblongis, floribus minoribus a typo recedit.

Folia plerumque elliptico-oblonga. *Flores* quam in typo minores. *Torus* calycecum 2 mm. longus. *Calyx* 1 mm. longus. *Corolla* circiter 3 mm. longa, ampulla basali subglobosa 3 mm. diametro; lobi circiter 6 mm. longi. *Antherae* 1·8 mm. longae.

Tropical Africa. Northern Nigeria: Nupe, on *Anona* sp., *Barter*, 1126; on *Mimosa asperata* Linn., *Barter*, 1149. Bornu, on *Acacia* spp., *Vogel*, 79. Bure, near Lake Chad, *W. R. Elliott*, 115.

Var. **salicifolius**, *Sprague*, l. c., anglice; foliis lineari-lanceolatis vel lineari-oblanceolatis distincta.

Folia lineari-lanceolata vel lineari-oblanceolata, 6·5–9·5 cm. longa, 0·8–1·9 cm. lata. *Pedicelli* circiter 1–5 mm. longi. *Torus* calycecum 3 mm. longus. *Corolla* 4–4·5 cm. longa. *Antherae* 2·5 mm. longae.—*L. globiferus*, Pax in Engl. Jahrb. xxxix. 615, e descr.

Tropical Africa. Abyssinia: Province of Tigre; Amba Harrer, 2200 m., *Schimper*, 888. Memsach District; Gessat Errar, *Schimper*, 414. Amba Sea, *Schimper*, 567. Province of Amhara; Lake Tana, Mitraa, 1800 m., on *Acacia* sp., *Rosen*; without precise locality, *Plowden*.

1240. **Loranthus (Constrictiflori) lanceolatus,** *Beauv.*, var. **corniculatus,** *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 355, anglice [Loranthaceae-Eulorantheae]; corolla in alabastro truncata breviter 5-corniculata a typo recedit.

Tropical Africa. Togo: Banyatera, 240 m., *Schröder*, 224.

1241. **Loranthus (Constrictiflori) erianthus,** *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 359, anglice [Loranthaceae-Eulorantheae]; affinis *L. glaucophyllo*, Engl., a quo corolla extus villosa recedit.

Ramuli juventute velutino-pubescentes, 2·5–3 mm. diametro; 20–25 cm. infra apicem; rami nigrescentes, inconspicue lenticellati, glabri; internodia 2–3 cm. longa. *Folia* opposita vel subopposita, subsessilia, late ovata, apice rotundata, basi leviter cordata, 3–4·5 cm. longa, 1·8–2·7 cm. lata, coriacea, glabra, subglauca, margine leviter crispato; nervi laterales utrinque 3–4, arcuato-ascendentes, procul a margine anastomosantes, utrinque elevati; petioli usque ad 1·5 mm. longi, pilosi. *Capitula* axillaria, solitaria vel fasciculata, 4-flora; pedunculus villosus, 1·5–2 mm. longus columna centrali cavis patelliformibus circumdata inclusa; bractea oblique cupularis, extus dense villosa, parte basali solida 0·5 mm. longa, margine dorsali ascendente 1·5–2 mm. longo, margine ventrali suberecto 0·8 mm. longo. *Torus* calycecum campanulatus, late apertus, 2·5 mm. longus. *Calyx* patelliformis, villoso-ciliatus, margine 1 mm. longo. *Corolla* in alabastro circiter 3·8 cm. longa, extus villosa, parte apicali ampliata oblongo-ellipsoidea 4 mm. longa subterete rotundata; tubus deorsum circiter 1·2 cm. unilateraliter fissus, ampulla basali subglobosa 3·5 mm. longa, 3 mm. diametro; lobi reflexi, spathulati, acuti, 7 mm. longi, parte superiore ampliata 4·5 mm. longa 1·5 mm. lata. *Filamenta* 1 mm. infra basin corollae loborum inserta, deflexa, sursum sensim angustata, 4 mm. longa, dente 0·5 mm. longo; antherae oblongae, 2·3 mm. longae. *Discus* pentagonus, 0·5 mm. altus, minute pilosus. *Stylus* superne metuliformis, parte incrassata 5·7 mm. longa infra medium majore, collo 1·8 mm. longo; stigma ellipsoideum, 0·8 mm. longum.

Tropical Africa. North-west Rhodesia, 1200 m., *Rogers*, 8353.

1242. **Loranthus (Erectilobi) Goetzei,** *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 365, anglice [Loranthaceae-Eulorantheae]; affinis *L. sansibarensi*, Engl., et *L. Fuellebornii*, Engl., ab illo floribus pedicellatis ab hoc ramulis foliisque crassioribus, umbellis 2–6-floris distinctus.

Ramuli juniores crassi, nigrescentes, subangulati internodiis compressis, basin versus subtiliter lenticellati; rami crassissimi, circiter 6 mm. diametro 15 cm. infra apicem, nodosi, brunneoli, grossissime densissime lenticellati lenticellis ferrugineo-brunneis; internodia circiter 6 mm. longa. *Folia* alterna, oblanceolata, recta vel subfalcata, apice obtusa vel rotundata, saepe apiculata, in basin

longe cuneata, 3·8–7·6 cm. longa, 1–2·5 cm. lata, rigide coriacea, glabra, opaca, in sicco utrinque subtilissime rugosa ; nervi laterales utrinque 2–3, obliquissimi, utrinque paullulum elevati ; petioli 6–10 mm. longi. *Umbellae* axillares, fasciculatae, 3–6-florae ; pedunculus crassus, 2–3 mm. longus, glaber ; pedicelli 1·5 mm. longi, glabri ; bractea ovato-cupularis, margine dorsali 1·5–1·8 mm. longo truncato umbonato, umbone perapplanato, margine ventrali 0·5 mm. longo. *Torus* calycecum anguste campanulatus, 4·4 mm. longus. *Calyx* ascendens, 1·8 mm. longus, irregulariter fissus. *Corolla* in alabastro circiter 4 cm. longa, extus glabra, rubra, tubi parte constricta lutea, loborum parte superiore violacea ; ampulla basalis subglobosa ; lobi lineares, subacuti, circiter 8 mm. longi, 1 mm. lati, apice introrsum uncinati. *Filamenta* sursum sensim angustata, 5 mm. longa, dente 0·5 mm. longo ; antherae oblongo-lineares, rotundato-subtruncatae, 2·5 mm. longae, connectivo loculos paullo excedente. *Discus* profunde 5-lobatus, 0·4 mm. altus, lobis deltoideis. *Stylus* superne metuliformis, parte incrassata 6–6·5 mm. longa, collo 2·5 mm. longo, supra medium in basin stigmatis incrassato ; stigma depresso-globosum, apice concavum, 0·7–0·8 mm. diametro.—*L. Sadebeckii*, Engl. in Engl. Jahrb. vol. xxx. p. 304, nec in Engl. Jahrb. vol. xx. p. 122.

Tropical Africa. German East Africa : Ussangu ; Kinga Range, Tikurugwa Mountain, 2400 m., on *Protea* sp., *Goetze*, 989.

1243. **Loranthus (Erectilobi) nyasicus**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 371, anglice [Loranthaceae-Eulorantheae] ; affinis *L. celtidifolio*, Engl., a quo corolla extus glabra distinguitur.

Ramuli basi foliis pluribus redactis suffulti, 4–15 cm. longi, valde compressi, nodosi, glabri, in sicco subtiliter striati, pulli, internodiis 2–6 cm. longis ; rami crassiusculi, 4–6 mm. diametro, pullo-brunnei, in sicco longitudinaliter rugosi, densiuscule inconspicue lenticellati, lenticellis in rimas longitudinales extensis. *Folia* opposita vel subopposita, anguste elliptico-oblonga vel lanceolata, apice rotundata vel obtusa, basi rotundata, rarius obtusa, 3·5–8 cm. longa, 2–3·2 cm. lata, coriacea, glabra, inconspicue subtiliter reticulata, praesertim supra ; nervi laterales utrinque circiter 3, obliquissimi, utrinque paullum elevati ; petioli 0·2–1 cm. longi. *Umbellae* axillares, solitariae, circiter 8-florae, glabrae ; pedunculus 7–8 mm. longus ; pedicelli circiter 6 mm. longi ; bractea unilateraliter evoluta, e basi disciformi vel patelliformi late ovata vel quadrangularis truncata vel subtruncata, umbonata, margine dorsali 1·3 mm. longo, margine ventrali patente vel patulo 0·35 mm. longo. *Torus* calycecum suburceolatus, circiter 2·5 mm. longus. *Calyx* suberectus, 0·5 mm. longus, paullulum lobatus, annulo intramarginali 0·25 mm. alto. *Corolla* circiter 4·5 cm. longa, extus glabra ; tubus deorsum 1·2–1·3 cm. unilateraliter fissus, ampulla basali ellipsoidea 5 mm. longa ; lobi erecti, subspathulato-lineares, acuti, 9 mm. longi, parte superiore cymbiformi intrinsecus visa lineari-lanceolata 5 mm. longa 1 mm. lata extus valde carinata intus strato duro basi abrupte terminato. *Filamenta* circa basin corollae loborum inserta, deflexa, sursum sensim angustata, 5·7 mm. longa, dente 0·35 mm. longo ; antherae lineares 2·8–3 mm. longae, connectivo loculos paullo excedente. *Discus* breviter lobatus, 0·8 mm. altus. *Stylus* in basin leviter

incrassatus, superne metuliformis, parte incrassata 5–6 mm. longa, collo 2·5 mm. longo; stigma depresso-globosum, non distincte lobatum.

Tropical Africa. Nyasaland, *Buchanan*, 1090; Namasi, *Cameron*, 8.

1244. **Loranthus (Erectilobi) Cecilae**, *N. E. Brown*, var. **Buchananii**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 374, anglice [Loranthaceae-Eulorantheae]; foliis majoribus suborbicularibus vel latissime ovatis, umbellis multifloris, corollae lobis vix carinatis a typo recedit. *Folia* 4–5 cm. longa, 4–4·5 cm. lata.

Tropical Africa. Nyasaland: Blantyre, very common, *Buchanan*, 133.

1245. **Loranthus (Erectilobi) Carsonii**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 376, anglice [Loranthaceae-Eulorantheae]; affinis *L. Keilii*, Engl., a quo foliis linearilanceolatis, umbellis multifloris, corolla minore recedit.

Rami elongati, circiter 75 cm. longi, 2·8 mm. diametro 30 cm. infra apicem, 4 mm. diametro 60 cm. infra apicem, juniores ut ramuli dense ferrugineo-pubescentes, seniores glabrescentes, brunneoli, inconspicue lenticellati; internodia 1·2–6·3 cm. longa. *Folia* opposita vel subopposita, lineari-lanceolata, apice obtusa, in basin attenuata, 4–9 cm. longa, 0·5–2 cm. lata, coriacea, glabra; nervi laterales utrinque circiter 4, obliquissimi, supra elevati, subtus paullum elevati vel vix adspectabiles; petioli 3–6 mm. longi, ferrugineo-pubescentes. *Umbellae* axillares, solitariae, subsessiles, multiflorae; receptaculum ferrugineo-pubescens, 3–4 mm. longum; pedicelli 1·3–1·5 mm. longi, ferrugineo-pubescentes; bractea e basi cupulari ovato-elliptica, ciliata, margine dorsali 1 mm. longo umbonato, margine ventrali 0·35 mm. longo. *Torus* calycecum cupularis vel subcampanulatus, 1·8 mm. longus, extus ferrugineo-puberulus. *Calyx* suberectus vel patulus, 0·5 mm. longus, breviter 5-dentatus, annulo intramarginali 0·17 mm. alto. *Corolla* circiter 3 cm. longa, extus breviter ferrugineo-pilosa, in alabastro parte apicali ampliata oblonga pentagona 3·5 mm. longa faciebus leviter sulcatis; tubus deorsum circiter 1·2 cm. unilateraliter fissus, ampulla basali subglobosa 2·3–2·6 mm. diametro; lobi erecti, spathulati, acuti, 6·5 mm. longi, parte superiore cymbiformi 3 mm. longa 0·8–0·9 mm. lata intrinsecus visa oblongo-lanceolata intus strato duro basi abrupte terminato. *Filamenta* paullulum supra basin corollae loborum inserta, deflexa, 3·6 mm. longa, sursum sensim angustata, superne 0·5 mm. incrassata, dente 0·25 mm. longo; antherae oblongo-lineares, 1·8 mm. longae. *Discus* pentagonus, crassus, 0·35 mm. altus, breviter lobatus. *Stylus* superne metuliformis, parte incrassata 3·4–3·6 mm. longa, collo 1·8 mm. longo; stigma subglobosum, circiter 0·5 mm. diametro.

Tropical Africa. Nyasaland: Urúngu; Fwambo, *Carson*.

1246. **Thonningia angolensis**, *Hemsl.* [Balanophoraceae-Langsdorffieae]; affinis *T. sessili*, Lecomte, a qua differt capitulis distincte pedunculatis, floribus masculis perianthio instructis et florum femineorum perianthio angustissime cylindrico ore obscure dentato.

Pedunculi 0·6–1·8 cm. longi, squamis crassis ovatis 6–8 mm. longis subacutis intus pilosis. *Capitula* bisexualia, globosa, 1·8–3 cm. diametro. *Flores masculi* exteriores, pauci, 1- vel 2-seriati, 5–7 mm. longi, perianthii lobis saepe 3 linearibus inaequilongis acutis quam columna staminifera brevioribus. *Flores feminei* minuti, numerosissimi, 2–3 mm. longi ; perianthium filiforme ; ovarium stylo longius.—" *T. sanguinea*," Monteiro, Angola and the River Congo, vol. i. p. 198.

Tropical Africa. Angola : Bembe, *Monteiro*.

1247. **Thonningia dubia**, *Hemsl.* [Balanophoraceae-Langsdorffieae]; species vel varietas imperfecte cognita. *T. sanguineae*, Vahl., proxima differt pedunculis (an semper ?) brevioribus, squamis parvis, capitulis majoribus et florum masculorum perianthio bene evoluto.

Volva brevis, truncata, margine lacerata. *Pedunculi* conferti, 0·6–1·2 cm. longi vel interdum obsoleti. *Squamae* triangulari-ovatae, 4–8 mm. longae, subobtusae. *Involucri* squamae ovato-lanceolatae, intermediae fere lineares, vix acutae, irregulariter serrulatae. *Capitula* unisexualia ; mascula circiter 50-flora, floribus 1–1·2 cm. longis bracteolis subulatis intermixtis. *Perianthii* lobi saepius 4, lineares, tubum subaequantes, aequales vel inaequales. *Flores feminei* capillares, 2–3 mm. longi ; perianthium stylum exsertum subaequans vel longius.

Tropical Africa. Cameroons : Cameroon Mountain, 1520 m., *Kalbreyer*, 105.

Perhaps not specifically distinct from *T. sanguinea*, Vahl., but the larger flower-heads with relatively longer involucral scales, the more fully developed perianth of the male flowers and other slight differences seem to justify separation.

1248. **Thonningia elegans**, *Hemsl.* [Balanophoraceae - Langsdorffieae] ; species ob capitula ovoidea et involucri squamas elongatas longe acuminatas distincta.

Volva bene evoluta, late irregulariterque lobata. *Pedunculi* 1–3 cm. longi, squamis crassis utrinque glabris inferioribus obtusis. *Involucri* squamae lanceolatae vel oblongo-lanceolatae, 2·5–3·5 cm. longae, longe acuminatae, acutissimae. *Capitula* unisexualia ; mascula tantum adsunt, circiter 50-flora. *Flores masculi* bracteolati, 1·5–1·75 cm. longi. *Perianthii* lobi saepius 3, ad staminum columnam medio adnati, inaequales, lineares, 2–4 mm. longi, acuti.

Tropical Africa. Gold Coast : Aburi, *W. H. Johnson*, 521.

1249. **Thonningia ugandensis**, *Hemsl.* [Balanophoraceae-Langsdorffieae] ; affinis *T. sanguineae*, Vahl., sed involucri squamis longe acuminatis acutissimis.

Volva circiter 1·5 cm. alta, fere truncata. *Pedunculi* 1·5–6·5 cm. longi ; squamae crassae, obtusiusculae, carinatae, intus leviter pilosae. *Involucri* squamae similes, sed majores, acutissimae, obscure serrulatae. *Capitula* unisexualia ; mascula circiter 2·5 cm., feminea 4 cm. diametro, globosa vel subglobosa. *Flores masculi* in quoque capitulo 40–50, 1·2–1·6 cm. longi, bracteolati. *Perianthii* lobi 3 vel 4, lineares, inaequales. *Staminum* columna perianthii lobos paullo excedens. *Flores feminei* 2–4 mm., sed saepe 3 mm. longi. *Stylus* quam ovarium dimidio brevior.

Tropical Africa. Uganda : Entebbe, *M. T. Dawe*, 1904.

1250. **Kyllingia pachystyla**, *Kükenthal* [Cyperaceae-Cyperinae]; habitu *K. odoratae*, Vahl., a qua spiculis longioribus, nuce oblonga, imprimis autem stylo valido basi incrassato longe distat. In nulla alia specie *Kyllingiae* stylum talem observavi.

Rhizoma brevissimum, lignosum. *Culmus* solitarius, 14–20 cm. altus, gracilis, sed firmus compresse trigonus, laevis, superne plurifoliatus, basi paullo incrassatus. *Folia* culmo multo breviora, 2 mm. lata, complicato-plana, longe attenuata, acute carinata, carina marginibusque spinuloso-scabra, pallide viridia, rigidula; vaginae brunneo-ferrugineae. *Spica* 1, bracteis foliaceis ad 3 mm. longis divaricatis suffulta, globosa, 7 mm. in diametro, compacta. *Spiculae* numerosae, demum patule divaricatae, lanceolato-ovatae, 4·5 mm. longae, compressae, biflorae. *Squamae floriferae* inaequales, stramineae, in acumen breve lanceolatum obtusiusculum rectum productae, in carina laeves, inferior utrinque 3–4-nervosa, florem hermaphroditum fovens, superior binervis, florem ♂ includens. *Nux* cum squama inferiore aequilonga, oblonga, nigra, nitida, dense punctulata, apiculata. *Stylus* validus, basi conspicue incrassatus. *Stigmata* 2 longa.

Tropical Africa. Angola: Mossamedes; near Humpata, grassy places, 1830 m., *H. H. W. Pearson*, 2774; ibidem (teste Dr. O. Stapf), *H. H. W. Pearson*, 2079 et 2767.

XIV.—ON THE INCREASE OF COLPOMENIA SINUOSA IN BRITAIN.

A. D. Cotton.

The marine alga *Colpomenia sinuosa* was first recognised on the British coast in September 1907, and an account of its appearance in the English Channel was shortly after published in the *Kew Bulletin* (1908, p. 73). Being a conspicuous plant, and one growing between the tide-marks, there could be no doubt whatever that it was a recent introduction. At that date the alga was only known in England from Torquay and Swanage, but within the last three years it has been received from various places on the coast of Dorset, Devon and Cornwall; it probably now extends along the whole shore from Lands End to the borders of Hampshire. In certain localities it occurs in extraordinary abundance, being the dominant alga, during the winter months, of the lower littoral region, and of the rock pools, and it affords a striking illustration amongst marine algae of the vigorous invasion of new territory by an introduced plant. In the previous note a general account of the alga was given, and its connection with the oyster-beds at Vannes described; the present communication deals with its general biology as observed in Dorset, and the distribution of the alga on the south coast of England.

In the autumn of 1908 *Colpomenia* was found in great quantity in the shallow and sheltered rock-pools between Weymouth and Portland, and the locality being a convenient one for observation, and easy of access from London, it was decided to keep the pools under observation, and to obtain a detailed knowledge of the

structure and life-history of the plant. Owing to unforeseen circumstances the investigation has not been carried out in the detail that was intended, but from 1908 to the end of 1910 the Weymouth neighbourhood has been visited nine times, and the growth of the plant as it occurs there has been followed during all seasons of the year.

Although a certain number of specimens are found during the summer, *Colpomenia* in these latitudes is essentially a winter plant. In a general way it commences growth in the autumn and disappears in late spring or early summer. The account given below refers to this main annual growth, the few odd plants that occur in summer, and which appear to be more numerous in some localities and in some seasons than in others, are not dealt with.

If the larger rock-pools are carefully searched during the beginning of September, a number of small *Colpomenia* plants will be found attached to the submerged and shaded parts of such stout algae as *Halopithys pinastroides* and *Cystoseira granulata*. At this date, the spherical thalli are not more than 1 or 2 mm. in diameter, and are thus apt to be overlooked. By the end of the month a marked increase in the size and number of the thalli is noticeable, and specimens a centimetre or more in diameter are of frequent occurrence. During October and November the growth is very rapid, and by the end of the latter month many specimens will have reached the average size of the winter-growth, namely 1½–2 inches in diameter.

In late autumn *Colpomenia* forms a most conspicuous feature of the lower part of the shore. It occurs in pools, and on rocks from about half-tide level downwards; it is also found in the sub-littoral region, namely in the shallow water immediately below the low-tide limit. On rocks the plant is generally epiphytic, growing attached to *Chondrus*, *Halopithys*, *Corallina*, and other algae, but specimens attached directly to the rock may also be found. In the sub-littoral region it is likewise epiphytic, and, if the locality be sheltered, it often occurs in great profusion. In pools it is even more abundant, the larger specimens crowding the stems of *Halopithys*, *Cystoseira*, and *Fucus serratus*; and the smaller ones being found on species of *Ceramium*, *Polysiphonia*, and many other algae. The *Colpomenia*-thalli act as buoys to their host-plants, and, when attached to slender species such as *Ceramium*, frequently cause damage to the shoots, in that they sooner or later break away carrying with them a portion of the slender frond. The conditions of rock-pools resemble those of the sub-littoral region rather than the littoral; and, though *Colpomenia* flourishes when exposed to the air as a low-littoral plant, it is always larger and more abundant when growing in pools or in shallow-water.

Spore-production takes place during winter, and continues till the months of April or May. Considerable irregularity, however, is to be noticed with regard to fruiting, some specimens commencing to form spores when quite small, whilst in others spore-production is delayed till the winter. In a general way fruiting material may be obtained in abundance between November and April, but it may be found also, without difficulty, from September to May.

During the winter months numbers of algae are washed away, and *Colpomenia* though still one of the most abundant weeds has been noted to be slightly less conspicuous in January than in November. Two or three reasons may be given for this. Not only are many of the larger algae on which it occurs torn off the rocks by the winter gales, but the *Colpomenia*-thalli themselves are of increased size, and thus more liable to be detached by wave action. Not a few specimens also become detached owing to imprisoned air within them rendering the thalli sufficiently buoyant to break away from their moorings when covered with water on the return of the tide.

In the spring *Colpomenia* is again very conspicuous, and a second maximum development has been noted in March or April. Numerous sporelings develop during winter and spring, so that specimens of all ages have been found at Easter. Such plants are either epiphytic or saxicolous.

After April *Colpomenia* begins to disappear. A certain number of plants continue to develop during April and May, but the bulk of the growth is by this time of a pale yellow-brown colour, and much eaten by marine animals, or infested with epiphytes. A small number continue till June, but after this date, with the exception of isolated examples, the plant disappears till autumn. Very large specimens are to be found in May ; these usually occur in rock-pools in the more sheltered localities (*e.g.*, Studland Cliffs) where there is less risk of their being torn or detached by wave-action. The large specimens probably represent individuals which germinated in autumn and survived the winter, but precise information on this point is not to hand, as efforts to keep individual plants under observation were not successful. Plants 9–10 cm. in diameter are not at all uncommon, and the largest noted measured 12 cm. in length. Sauvageau refers to a case at Cherbourg (where *Colpomenia* has developed in unprecedented abundance) in which a plant measuring 15 cm. was obtained, a fact which he states is remarkable, as the size exceeds anything he has seen in the Mediterranean or at Teneriffe. The large plants found in May and June seldom show well the "ballon" habit. They are often irregular in shape, and more or less eaten and torn.

Turning now to ecological considerations, the substratum to which *Colpomenia* is found attached has already been dealt with, and also its vertical distribution on the shore which is regulated by the factors of illumination and desiccation ; its distribution with regard to wave-exposure may now be considered. As far as has been observed by the writer *Colpomenia* is a plant of sheltered water. In the pools below the Nothe at Weymouth, and on the sheltered ground within the Portland breakwaters, it is plentiful. At Studland also, where the cliffs face north and the rock-pools are particularly sheltered, it is very abundant, the pools from this region having provided the largest specimens which have been seen. At Handfast Point (Old Harry Rock), where rougher water occurs, *Colpomenia* is not found. The effect of exposure may be observed also at Swanage. In the quiet water near the pier the plant is plentiful ; at Peveril Point, where the conditions are exposed, it is almost absent, or only found between the two reefs which afford a measure of shelter. In Durlston Bay, with its shelving rocky shore

open to the S.E. and semi-exposed, it has not been found ; though it should be added that this ground has not been thoroughly examined. In other parts of England *Colpomenia* is found in sheltered positions ; and, judging by the accounts given by French writers, it is most frequent in similar situations on their side of the Channel. Sauvageau, however, mentions one spot on the island of Oléron where he found *Colpomenia* exposed to the "mer sauvage."

With regard to the distribution of the alga in Britain, the records given below show that it is widespread in S. Cornwall, S. Devon and Dorset. It will be observed that the alga existed on the Cornish Coast previous to 1907, and this may be true of other places from which it is here recorded for the first time. There is no doubt, however, that it now occurs in greatly increased quantities ; and that, with regard to Weymouth and Swanage, it was absent or only present in small quantity previous to 1906 and 1907 respectively. It will also be noted that several of the specimens were collected in July and August, which suggests that summer-plants are not infrequent in the West of England. Scilly Islands specimens, collected there in August 1908 and 1909, were forwarded by Mr. R. W. Smitham, who states that he first noted the plant on those islands in August 1905, in a spot where the Breton shell-fish boats shelter when driven from their fishing-grounds near the Seven Stones lightship. This date would appear to be the earliest that *Colpomenia* was observed on either side of the English Channel : at the time (as at other places) it was mistaken for *Leathesia difformis*. Mr. Smitham also mentions that the alga occurs at Fowey, Cornwall, and that he first observed it there in 1906. Further Cornish records were supplied by the Rev. H. Boyden, who found the plant at Long Rock, Mounts Bay, in July 1908 ; and his dried collection contains two specimens from West Looe, collected in July 1906. Mr. Boyden also forwarded specimens from Falmouth, where he observed a few small plants in rock-pools near the low-water line in August 1909. In Devon, *Colpomenia* was noted by Mr. and Mrs. Gepp at Goodrington and Paignton in March and June 1910 ; and by Mr. Boyden in August 1910 at Torquay (where it was first observed by Mr. Holmes in 1907). The Dorset records are :—Weymouth, Chapman's Pool, Swanage, Studland, and near the mouth of Poole Harbour, in the first four of which places it occurs in great profusion.

The above records probably represent all the suitable localities on the south coast that have been visited by algologists during the past three years with a view to noting the presence of *Colpomenia*. It doubtless occurs in many other places, and, judging from its abundance in several of the districts named, it is reasonable to conclude that it may be found more or less along the whole coast from Lands End to Poole. It is regrettable that there are so few persons in England who may be appealed to for help in a matter of this kind, and that, in a country possessing a fine sea-board and excellent collecting-grounds, the systematic study of algae has fallen to so low an ebb.

With regard to the absence of *Colpomenia* in other parts, a certain amount of evidence has been obtained. Mr. Smitham visited Padstow and two other localities on the North Cornwall

coast, in 1906, 1907 and 1908, and did not observe the plant. Parts of Hampshire and Sussex have been examined by the writer, but though the plant was not seen, its absence cannot be certified, as the tides on one occasion and the season of the year on the other were somewhat unfavourable. It will be interesting to follow the progress of *Colpomenia* in the English Channel, and to note how far it will advance in any easterly direction, and whether it will appear on the northern coast of Cornwall and Devon. Sauvageau records a single specimen found attached to wreckage at Wimereux (near Boulogne), but, with this exception, the alga is not known further east than Poole Harbour in England and the Cherbourg neighbourhood in France.

When *Colpomenia* was first recorded in the English Channel doubt was expressed as to whether it would be able to survive the cold of winter. Up to the present time an ordinary English winter has in no way injured the plant; and it is remarkable that the alga reaches its maximum development during the season that the sea is coldest; there is thus every probability that it has become an essential constituent of our south-coast flora. The species occurs in many of the warmer parts of the world, and it would be of interest to learn something of its seasonal development in the tropics, and in Australia, or other parts of the southern hemisphere. As far as has been observed the vigour of *Colpomenia* on the British coasts shows no sign of abatement, the growth during the spring of 1910 being as abundant and luxuriant as on any previous occasion. Sauvageau mentions a case at Vannes in which its growth was completely suppressed by a species of *Enteromorpha*. Some oyster-beds, which he states were deplorably invaded by *Colpomenia* in 1906, were attacked by the *Enteromorpha* (probably a variety of *E. clathrata* J. Ag.), in 1907. The latter developed in such profusion that it choked the *Colpomenia*, and in the spring of 1908 hardly a single specimen was to be found.

A striking illustration of the abundance of this alien plant at Weymouth was met with in November 1908 on walking between Ferry Bridge and Portland. A strong northerly wind was driving in a variety of freshly detached weed, and not only was *Colpomenia* found cast up in profusion on the beach, but hundreds of "ballons" of all sizes were floating on the water, and were being driven ashore by the wind and incoming tide. The significance of the term "ballon" employed by the *ostréiculteurs* of Vannes is appreciated when the plant is seen floating in this way, and often with pieces of shell or other algae attached; and it could be easily imagined that, had the thalli been growing on oyster-beds instead of rocks or other algae, a certain amount of spat might have been pulled up with them on their detachment. In many cases the thallus was torn below and contained air, but in others it was not perforated, and consequently floated low in the water. It is probable that a ground-swell had detached a large number of plants, and with the particular wind obtaining they were driven ashore in the manner described. Although Weymouth has been visited many times since that date, so good an illustration of "ballon" habit has not again been seen.

XV.—ECONOMIC NOTES ON TRANSVAAL GRASSES.

The following notes have been supplied by Lt.-Col. A. F. Appleton, P.V.O., of the Army Headquarters at Pretoria. They were drawn up jointly by him and Mr. Burtt Davy, Botanist of the Transvaal Department of Agriculture, whilst the determinations were revised by Dr. O. Stapf, excepting the species marked with an asterisk, of which no specimens were submitted. Lt.-Col. Appleton supplied on a former occasion—when serving in the Somali Campaign of 1902-04—some valuable information on the fodder grasses of Somaliland which was incorporated in a paper on the Grasses of Somaliland by Dr. O. Stapf (*K.B.* 1907, pp. 203–226). As he has special opportunities for collecting experience regarding the economic value of the grasses of the Transvaal in their wild condition, and as very little is known on the subject, it has been thought desirable to publish his and Mr. Burtt Davy's joint notes in the hope that this may lead to a more comprehensive and systematic treatment of a subject the importance of which is self-evident in the case of a country so rich in grazing land as the Transvaal.

Imperata arundinacea, *Cyr.*, var. **Thunbergii,** *Hack.* (Fl. Cap. vii., 320).

A hard, wiry grass which is common in swampy places, but is of no value for feed.

Urelytrum squarrosum, *Hack.* (Fl. Cap. vii., 330).

A coarse, hard grass, with rather a bitter taste, of little or no economic value.

Elionurus argenteus, *Nees* (Fl. Cap. vii., 332).

This grows plentifully round Transvaal farms and forms the bulk of bedding grass. It is a very sour grass, disliked by all kinds of stock, having a bitter turpentine flavour.

***Andropogon pertusus,** *Willd.*, var. **capensis,** *Hack.* (Fl. Cap. vii., 345).

A useful hay grass.

Heteropogon contortus, *R. et S.* (*Andropogon contortus*, L.; Fl. Cap. vii., 350). (Spear Grass.)

A coarse grass not to be encouraged, for, though yielding good grazing when young, the sharp calli of the ripe fruits are injurious to sheep, sometimes causing death.

Cymbopogon marginatus, *Stapf*, var. **validus,** *Stapf* (*Andropogon Nardus*, L., var. *marginatus*, Hack. γ *validus*, Stapf; Fl. Cap. vii., 352).

This is one of the Tambookie grasses, and is of no use for fodder.

Cymbopogon polyneuros, *Stapf* (*Andropogon Schoenanthus*, L., var. *versicolor*, Hack.; Fl. Cap. vii., 354). (Turpentine Grass.)

A useless, hard, bitter grass.

Andropogon hirtus, *L.* (Fl. Cap. vii., 355).

A hard, wiry grass which is of no use for fodder.

Themeda Forskalii, *Hack.* (*Anthistiria imberbis*, Retz.; Fl. Cap. vii., 366).

Common everywhere, growing to a height of from one to three feet. It is one of the most useful fodder grasses of the veld as well as one of the commonest. It is a good hay grass and liked by stock of all kinds, but it should be cut before the seed-heads turn brown. In the condition in which it is usually cut for hay (in March) it has but little feeding value.

Paspalum dilatatum, *Poiret.* (Breed zaad.)

A large water-grass, a native of America. It forms excellent though coarse pasturage, and when well-established keeps green through most of the winter in moist heavy veld soils. In Australia it is valued as a hay grass for dry seasons.

Digitaria monodactyla, *Stapf* (Fl. Cap. vii., 373).

A useful pasture grass, but usually found in scattered tufts.

Digitaria sanguinalis, *Scop.* (Fl. Cap. vii., 378). (Crab Grass.)

An alien which is spreading rapidly. It is an annual. When properly cured it forms good hay and also affords excellent pasturage.

Panicum serratum, *Spreng.* (Fl. Cap. vii., 388).

A good grass growing plentifully in grazing land and liked by stock.

Panicum Helopus, *Trin.*, var. **glabrescens**, *K. Schum.* (Fl. Cap. vii., 392).

An annual, spreading rapidly, but of poor feeding properties.

Panicum minus, *Stapf*, var. **planifolium**, *Stapf* (Fl. Cap. vii., 411). (Sweet Grass.)

An annual and one of our most valuable forage grasses for the moist land of laagtes, yielding a heavy crop of good forage hay. Common on old lands, and one of the two grasses sold for sweet grass hay.

Axonopus semialatus, *Hk. f.* (Fl. Cap. vii., 418).

A coarse native grass liked by stock.

***Setaria nigrirostris**, *Dur. et Sch.* (Fl. Cap. vii., 423).

A perennial, rather coarse grass, but greedily eaten by stock of all kinds. The seed is much liked by quail and other birds and is therefore difficult to collect. It is one of our most useful grasses.

Setaria imberbis, *R. et S.* (Fl. Cap. vii., 427).

Affords a fair feed.

Setaria verticillata, *Beauv.* (Fl. Cap. vii., 429). (Klit's Grass.)

A useless, annual, naturalised weed. It tangles the wool of sheep and goats.

Pennisetum Thunbergii, *Kunth.* (Fl. Cap. vii., 436).

A promising perennial grass of wet lands.

Tricholaena rosea, *Nees* (Fl. Cap. vii., 443). (South African Red-top.)

An annual or biennial grass which is found plentifully on roadsides and old lands. It makes good hay.

Trichopteryx simplex, *Hack.* (Fl. Cap. vii., 450).

Readily eaten, but not of much value.

Trichopteryx simplex ? *Hack.*, var. **minor**, *Stapf* (Fl. Cap. vii., 450).

Growing in large clumps, and a fair feed when young, but the older stems are hard and wiry.

Tristachya Rehmannii, *Hack.* (Fl. Cap. vii., 453).

A dangerous grass on account of the awns.

***Koeleria capensis**, *Nees* (*K. cristata*, Pers.; Fl. Cap. vii., 468).

A perennial grass of fair nutritious value which sustains itself on dry soil. It is too short to be of much value for hay, but is useful for sheep.

Agrostis lachnantha, *Nees* (Fl. Cap. vii., 549).

A good grass which usually grows on river banks or wet places, keeping green through the winter and liked by stock.

Aristida barbicollis, *Trin. et Rupr.* (Fl. Cap. vii., 559).

A hard, wiry, and practically useless grass.

Tragus racemosus, *All.* (Fl. Cap. vii., 577). (Carrot-seed Grass.)

A useless annual which is injurious to wool.

***Sporobolus indicus**, *R. Br.* (Fl. Cap. vii., 586).

A wiry, tufted, and very strong grass, which is usually found on roadsides, old lands and farmsteads and is spreading rapidly. It is readily eaten by stock when young, but soon becomes too tough and wiry and is then usually avoided except in scarcity of other food.

Eragrostis curvula, *Nees* (Fl. Cap. vii., 599).

A valuable pasture grass.

Eragrostis plana, *Nees* (Fl. Cap. vii., 609). (As Grass or Outspan Grass.)

Like most of the species of *Eragrostis*, this grass makes good grazing and is much liked by stock when young, but soon becomes hard and wiry.

Eragrostis chalcantha, *Trin.* (Fl. Cap. vii., 615).

A good sheep grass.

Eragrostis brizoides, *Nees* (Fl. Cap. vii., 622).

A good sweet fodder grass.

Cynodon Dactylon, *Pers.* (Fl. Cap. vii., 634). (Doob- or Dub-Grass or Bermuda Quick Grass.)

Yields excellent sweet pasturage on abandoned lands. In the Southern United States and India it makes good hay which keeps sweet for years in stack. It grows very freely and to a large size on cultivated land, but is most valued as a sand binder for the walls of dams, &c.

Michrochloa caffra, *Nees* (Fl. Cap. vii., 636).

A poor feed.

Chloris virgata, *Sw.* (Fl. Cap. vii., 641). (Old Lands Grass or Sweet Grass.)

An annual weed in old lands, keenly relished by stock and considered a highly nutritious fodder. It is largely used for hay, in which character it commands a good price. Baled sweet-grass hay is sold largely in the markets of Pretoria and Johannesburg.

Chloris petraea, *Thunb.* (Fl. Cap. vii., 643).
Found chiefly on kopjes, and of very little feeding value.

Eleusine indica, *Gaertn.* (Fl. Cap. vii., 645). (Goose Grass.)
A troublesome annual weed, of no use in the winter.

Bromus unioloides, *H. B. K.* (Fl. Cap. vii., 734). (Rescue Grass or Prairie Grass.)
A native of South America and Mexico which has been introduced into South Africa. It is an excellent drought-resisting forage grass in suitable districts. It grows rapidly and seeds freely, but unfortunately dies out after seeding. If prevented from seeding by mowing or close grazing, its duration may be continued over two or three years.

Lolium temulentum, *L.* (Fl. Cap. vii., 738). (Darvel, Cheat, or Drabok.)
An alien, annual weed, introduced from Europe; sometimes causes poisoning.

Lolium perenne, *L.* (Perennial Rye-grass.)
An introduced pasture grass which is subject to rust and is not doing well in the Transvaal.

XVI.—SPATHOLIRION.

S. T. Dunn.

In 1896 Ridley described as a new genus under the above name (Journ. Bot. 1896, 329) an herbaceous plant of the Natural Order *Commelinaceae* which he had received in a living state from Legeh in the north-eastern part of the Malay Peninsula. It is distinguished from *Streptolirion* by its monoecious flowers and pluriovulate loculi as well as by its habit. Among the unnamed collections of Chinese plants at Kew which have recently been placed in my hands for determination are two Commelinaceous plants having the arrangement and structure of their flowers identical with those of *Spatholirion*, and, although Ridley's plant is an acaulescent one while these two are tall herbaceous climbers, there can be no doubt that all are congeneric.

One of the Chinese species was first collected some 30 years ago by Delavay, but the specimens seem to have been accidentally left among his sheets of drying paper at Yunnan-fu until found there by Ducloux a few years ago. Meanwhile, however, the same plant had been gathered by the latter collector in the neighbourhood of Yunnan-sen and sent to Paris, where Gagnepain described it as a new *Streptolirion*. Gagnepain, working perhaps with imperfect material, did not appreciate the divergence from that genus shown by the number of ovules in each cell and the monoecious character of the flowers, neither of which are indeed mentioned in his description.

The second Chinese species which has been received at Kew from Yunnan, Kweichau and Szechuen is fortunately represented by complete material, including fruit, so that the characters of the capsule and seeds of the genus can now be described for the first time.

Spatholirion, *Ridley*.

Clavis specierum.

Caulis nullus ... ... 1. *S. ornatum.*
Caulis longus scandens
  Folia subtus hirsuta ; ovarium acutum ... 2. *S. longifolium.*
  Folia glabra ; ovarium abrupte acuminatum 3. *S. scandens.*

1. S. ornatum, *Ridley*, in Journ. Bot. 1896, 329, t. 360.
Malay Peninsula. Legeh : Tomoh (fide *Ridley*).

2. S. longifolium, *Dunn*. *Streptolirion longifolium*, Gagn. in Bull. Soc. Bot. Fr. xlvii. (1900), p. 334, t. xi.

China. Yunnan : Yunnan-sen, *Ducloux*, 503 (fide *Gagn.*), "trouvé dans de vieux papiers du p. Delavay," Yunnan-fu, *Ducloux*, 680.

3. S. scandens, *Dunn*. *Herba* alte scandens, inflorescentia excepta, omnino glabra. *Folia* alterna, oblongo- vel ovato-lanceolata, gradatim acuminata, basi obtusa, membranacea, 10–20 cm. longa ; petioli 1–3 cm. longi basi ocreati. *Flores* polygami sessiles in cymis scorpioideis paniculam 8–15 cm. longam formantes ; paniculae axillares, pedunculis sibi paullo aequilongis, ramis puberulis alternis, infimo distante hermaphrodito, bractea foliacea sessili cordata, 6–7 cm. longa, 4–6 cm. lata, suffulto, ceteris masculis. Florum hermaphroditorum : *Sepala* 3, obovata, obtusa, 8 mm. longa, rosea, rubida vel viridula aspectu cerea. *Petala* 3, similia sed linearia. *Stamina* 6, petalis paullo longiora, antheris didymis lateraliter dehiscentibus, filamentis medio pilosis. *Ovarium* ovatum in stylum curvatum abrupte acuminatum, loculis 3, 5–7-ovulatis. *Flores masculi* similes sed ovario carentes, post anthesin decidui paniculae partem masculam persistentem nudam reliquentes. *Capsula* loculicidalis ; valvae 3, quadratae, 8–9 mm. longae, chartaceae. *Semina* 5–7, in seriebus duabus primo in axi loculi cujusque disposita, dissepimentis detractis ob valvis resilientibus diu in medio fructu in columna cohaerentia, oblato-spaeroidea margine acuta, 3–4 mm. diametro, 2 mm. alta ; testa dura, siccitate nigra ; albumen copiosum corneum ; embryo minutus.

China. Kweichau : woods, Pin-fa, *Cavalerie*, 3322 ex Herb. Acad. Géogr. Bot. ; Szechuen : Chang-yang, *Wilson*, 2526 ; Yunnan : mountain moors at 1800–2100 m. ; Mengtze, *Hancock*, 374 ; north mountains, Mengtze, at 2100 m., *Henry*, 9447 ; Mi-lê district, *Henry*, 9447A ; forests in west mountains at 1500 m., *Henry*, 12,504, 12,504A, 12,504B ; Yunnan, *Ducloux*, 742.

XVII.—MISCELLANEOUS NOTES.

Mr. Joseph Davenport Snowden, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant in the Agricultural Department of Uganda.

John Hinchley Hart.—We have received the sad news of the death, on February 20th, of Mr. J. H. Hart, F.L.S., formerly Superintendent of the Royal Botanic Gardens of Trinidad, after a

long and painful illness. Mr. Hart was born in 1847, and received his early education at the Grammar School of Botesdale, Suffolk. He then took up the study of Agriculture and Gardening, and from 1872–75 held a position as landscape-gardener in Nova Scotia. From there he proceeded to Jamaica to take charge of the gardens and grounds of King's House, and in 1881 became Superintendent of the Cinchona plantations in that island.

On the departure of Mr. (now Sir Daniel) Morris in July, 1886, he acted as Director of Public Gardens and Plantations until his transfer to Trinidad as Superintendent of the Royal Botanic Gardens in June, 1887. Some ten years later he designed and planted the Botanic Station at Tobago, which was then added to his charge. He will also be remembered for having established the St. Clair experimental station in Trinidad. Upon his retirement from Government service in 1908, the old botanical department of Trinidad was merged into a wider organisation, and the new Department of Agriculture was created with Professor P. Carmody as its first Director.

Mr. Hart's work in the field of botany, agriculture and horticulture in the West Indies covered a long period, and was distinguished throughout by unbounded energy and marked ability. The scope of his duties increased as time went on from the charge of the gardens to the superintendence of a fairly large botanical and agricultural department, and he also took a keen and active interest in the affairs of the Agricultural Society. His knowledge of the flora of the West Indies and particularly of the floras of Jamaica and Trinidad was extensive. Among his published works one of the most useful is the Herbarium list of the botanical department of Trinidad published in 1908. He also wrote an interesting account of a visit to Nicaragua in 1885, and in 1892 published "A Treatise on the Cultivation and Curing of Cacao," which appeared in a second edition in 1900. In December, 1909, he edited a volume of "The Ferns and Fern Allies of the British West Indies and Guiana," by the late Mr. G. S. Jenman. He also edited the quarterly Bulletin of the botanical department.

Mr. Hart was a man of decided opinions which he would not readily change, though he was open to conviction, and he was always prepared to defend what he believed to be right against all opposition. He did much useful work in connection with plant diseases, and was among the first in the West Indies to recognise the true significance of fungi and insects in causing disease, and for many years past he has been a valued contributor of interesting material to Kew.

A correspondent in Trinidad informing us of his death writes: "He was regarded as one of the best and most reliable authorities in the tropics in his special line of engagement and thought. We have lost an invaluable friend and a counsellor of discretion, judgment and ability that one seldom has the privilege of meeting in the plant world in this part of the earth."

An interesting note of Mr. Hart's work appeared in the Proc. Agric. Soc., Trinidad, 1908, pp. 217–219, together with his portrait, and was published on the occasion of his retirement from government service. A further note was published in the same journal, 1911, part 2, pp. 141–143.

Col. R. H. Beddome.—By the death of Col. Beddome, F.L.S., which occurred at his residence, Sispara, West Hill, Putney, on 23rd February, 1911, another gap has been made in the ranks of Indian officers who have devoted their leisure to botanical studies. Col. Beddome, who at the time of his death was in his 81st year, was educated at Charterhouse and entered the Indian Army in 1848. He rose to be Quartermaster and Interpreter to his regiment, the 42nd Madras Infantry, in 1856. As a young officer he showed a strong taste for natural history pursuits, devoting himself both to zoological and botanical studies. His aptitude in this direction was well and favourably known, and in 1857 when a Forestry Department was for the first time being organised in Madras, with the late Dr. H. Cleghorn as Conservator, Lieut. Beddome was selected to act as Cleghorn's senior assistant. Some years later, when Cleghorn became Inspector-General of Forests under the Government of India, Beddome succeeded him as Conservator in Madras and filled this appointment until he retired from the service of Government in 1882. His association with the Forest Department naturally led to Beddome giving more attention to botany than to zoology, and to a considerable extent to botany in relationship to the needs of forest officers. The results of his studies in this direction were embodied in his work on 'the Trees of the Madras Presidency,' published in 1863, followed by his 'Flora Sylvatica of Southern India,' a work in two volumes with 400 quarto plates issued between 1869 and 1874. A report by Beddome on the Nelambur Teak Plantations was issued by the Government of Madras in 1878. Beddome, however, gave much attention to various families, the members of which are not of economic importance; one of his earliest serious contributions to systematic botany was a meritorious resumé of the South Indian species of *Impatiens*. His most important taxonomic contribution was, however, unquestionably his 'Ferns of Southern India,' containing descriptions and quarto plates of the species to be met with in the Madras Presidency, published in 1863, with a supplement which appeared in 1876. This was followed by a work entitled 'Ferns of British India,' uniform with the preceding, giving descriptions and plates of those Indian species not figured in the previous work. The 'Ferns of British India' was issued between 1865 and 1870, but before its completion Beddome commenced the preparation of another work entitled 'Icones Plantarum Indiae Orientalis,' also with quarto plates and descriptions, of interesting species from Southern India and Ceylon. Of this work only one volume containing 300 plates was published between 1869 and 1874.

The appearance of his works on the ferns of India at once gave Beddome a recognised place among Indian pteridologists, whom he placed under a further obligation by preparing a concise 'Handbook to the Ferns of British India, Ceylon and the Malay Peninsula,' copiously illustrated by reduced copies of the figures contained in his own bulkier and less accessible works. This work appeared in 1883 shortly after his retirement, and was subsequently augmented by a supplementary fasciculus. After his arrival in England Col. Beddome was for many years a frequent visitor to the Herbarium and Gardens at Kew, and in 1885 took a vigorous

part in discussions on Indian ferns with two other highly respected Indian pteridologists, Lieut.-Col. F. Henderson, who died in 1895, and Mr. H. C. Levinge who died in 1896. In 1898 Col. Beddome presented to Kew his Indian moss herbarium which is now incorporated in the general collection. During his retirement he still devoted himself to the study of ferns and was always glad to assist in the determination of the species contained in the collections of other botanists. His last work of this kind was perhaps the task of naming at Kew the ferns collected by Mr. A. Meebold, during his Indian journeys, and those collected by Mr. H. N. Ridley, during his more recent Malayan journeys. This he completed only last year, and having finished with the ferns he took up for the first time the study of *Selaginella* and worked out with great care the Malayan specimens. His last visit to Kew was paid on 27th January, 1911, and was in connection with his final revision of the *Selaginella* list.

Besides being a keen herbarium worker Col. Beddome was also an ardent gardener, devoting much attention to the cultivation of various natural families which were especially attractive to him. His skill in raising and flowering, both out of doors and under glass, plants that are admittedly difficult to cultivate, was well known in gardening circles. The later years of his life were largely occupied in the preparation of interesting and useful annotated lists, which he prepared at Kew, and which were published in the Journal of the Royal Horticultural Society, of the species of *Campanula*, of *Gesneraceae* and of *Acanthaceae*. To the first he had long given especial attention in the open; to the others he had long been similarly devoted indoors. These lists, besides carefully checking the names in use for the various species, embody the results of his own personal experience as a gardener, from 1882 onwards. The *Campanula* list appeared in 1907; the *Gesneraceae* and *Acanthaceae* lists were published in 1908.

Some of the plants successfully flowered by Beddome have from time to time found a place in the pages of the *Botanical Magazine*, and on more than one occasion the collections of living plants at Kew have benefited by the presentation of specimens of rare species from his private collection at Sispara.

Robert Mackenzie Cross.—We regret to have to announce the death of Mr. R. M. Cross in Scotland at the age of 75. Mr. Cross, who was born at Dumbarton in 1836, served his apprenticeship in the gardens of Sir James Colquhoun, Bart., at Luss, and, after further service in Glasgow, entered the Royal Botanic Gardens, Kew, in June, 1857. He left in April, 1859, and shortly afterwards (see *Kew Report* for 1859, p. 3) was selected by Sir Clements Markham, on the recommendation of Sir William Hooker, to go out to Ecuador to assist Richard Spruce in the collection of Cinchona in the forests and to establish the plants in Wardian cases at Guayaquil.

The able way in which Cross performed these services and the successes which attended the hazardous journeys he undertook in

Ecuador and Colombia are duly recorded in Sir Clements Markham's book entitled "Peruvian Bark." An account of his arrival at Ventanas in July, 1860, and of the difficulties he encountered is given by Spruce in the second volume of his book on the Amazon and Andes.

In 1861 he went to Loxa and collected seeds of *Cinchona condaminea* on which he wrote a short report to the Secretary of State for India, and a much longer report on the Pitayo Cinchona was published giving an account of the results of his expeditions to obtain this plant in Colombia. Three journeys were made to Pitayo, and a report on the last, undertaken in 1868–69, was published in the correspondence relating to Cinchona cultivation in India laid before the House of Commons in 1876.

In 1875 Cross went out to Panama to collect plants and seeds of *Castillon elastica*. The following year he sailed from Liverpool for Para and was engaged in Brazil in an investigation of the Para and Ceara Rubber trees and the Balsam of Copaiba, of all of which he collected both plants and seeds. The report which he wrote on the conclusion of this journey is illustrated with numerous figures and gives an interesting and useful account of the mode of tapping of the trees and of the preparation of the rubber in the Brazilian forests.

After his return from the Amazon Mr. Cross settled in Edinburgh and a few years ago went to live at Torrance of Campsie where he died on March 1st last. He was of a retiring disposition and the value of his work is probably not very generally known.

B. E. C. Chambers.—During the last twenty years no private garden in the South of England has been more appreciated and admired by lovers of trees and shrubs than that at Grayswood Hill, Haslemere. We deeply regret to learn that Mr. Chambers, whose creation it was, died at Hyères on March 23rd last. In his younger days Mr. Chambers was connected with the Yorkshire collieries, and was at one time Mayor of Rotherham. For reasons connected with his health he came south about thirty years ago. For many years pleasant relations have existed between him and Kew, and this establishment owes to him many choice plants. However rare a plant might be, if he had more than one he was always willing to give it to Kew. The Grayswood Hill garden is almost unique in the quality of the plants it contains. There is scarcely a common plant in it, and certainly nowhere so near London can one find such a rich, varied and healthy collection of Japanese, Chinese, Chilian, New Zealand, and North American trees and shrubs. Mr. Chambers was a true gardener, and it was the rarest thing to see a plant in his grounds not in the best of health. This was mainly due to his personal interest in his plants and to his intimate knowledge of their requirements. Mr. Chambers was gifted with a most charming personality, and remarkable as his garden was, one never saw it in his company without feeling that it owed half its charm to the courteous and distinguished man who made it.

Chokushi-Mon.—The Royal Botanic Gardens, Kew, have received a remarkable and beautiful addition by the gift of "The Gate of the Imperial Messenger" or "Chokushi-Mon," exhibited at the Japan-British Exhibition held in London last year.

The establishment—or rather the nation—is indebted to the Kyoto Exhibitors' Association to the Japan-British Exhibition for this presentation. At the Exhibition the Gate formed the entrance to Kyoto-Kan. In the Royal Gardens it has been re-erected on the old mound, known as Mosque or Mossy Hill, near the Pagoda, on which a mosque, designed by Sir W. Chambers, used formerly to stand.

The Gate is a faithful reproduction, four-fifths natural size, of the gateway of the great Buddhist temple of Nishi Hongwanji at Kyoto. The original gate was made for the Palace of Hideyoshi, which was built in the latter half of the sixteenth century at Momoyama, a few miles south of Kyoto, and was afterwards moved to its present position in the temple.

The original gate, as well as the magnificent temple to which it gives access, represent the art and skill attained by the artists and craftsmen of Hideyoshi's time (middle of the sixteenth century). It was Hideyoshi who crossed over to Corea and made the name of Japan widely known to other nations; he died in 1598.

The carvings on the original are ascribed to the famous "left-handed Jingoro." The replica is by Wada Genyemon, of Kyoto, a noted temple wood-carver. The beautiful panels, with their wealth of carvings, portray Oriental legends. The Chinese fable of Kosekko and Choryo, a narrative illustrating the unswerving devotion and fidelity of a pupil to his teacher in eagerness to learn, is the subject of the openwork carving on the blocks of wood on the front panels. According to the legend, the hard-hearted master tested the sincerity of the warrior—for Choryo led armies in many a battle—by dropping first his right shoe, then his left, and then both shoes into the river. Instantly, without hesitation, Choryo plunged into the troubled waters, recovered the shoes and brought them back to Kosekko, imploring him to impart the secret of his learning. The right panel depicts Kosekko on a bridge on horse-back, with his left foot bare. The left shows Choryo holding up the recovered shoe. He is mounted upon a dragon, which, moved by the young man's faithfulness to his purpose, came to his assist-ance. The reverse panels have carvings of a floral design.

The beams are supported by elaborately carved wood work, representing phœnix, winged dragons, and other imaginary creatures. The delicate open-work diapers of the upper panels, and the bold knife-work of the conventionalised lions of the lower part of the Gate, will repay a careful study. The graceful curves of the roof lines show the architectural style of the sixteenth and seventeenth centuries, known as the Momoyama period.

The replica is a faithful copy of the original, not only in design, but also in materials, the timber used in both cases being "Keyaki" or "Hinoki" wood (*Cupressus* or *Retinospora obtusa*). The wood is fragrant, close grained and very durable. The roof is covered with cedar-bark shingles, and is over a foot thick, and a protective covering of sheet lead has been placed over the cedar at Kew. Some young trees of *Cupressus obtusa* have been planted on the mound near the Gate.

Presentations to Gardens.—Professor H. H. W. Pearson, South African College, Cape Town, who has just returned from an expedition to Namaqualand under the auspices of the Percy Sladen Trustees, has sent a remarkably interesting collection of living succulents to Kew from that region. The plants, which have reached Kew in consignments during this spring, have arrived in excellent condition and are now beginning to grow vigorously. The genus *Mesembryanthemum* is largely represented, and some of the specimens no doubt belong to undescribed species. Among the most interesting are those with only two fleshy leaves, allied to *M. truncatellum*, and one fine specimen belonging to this group measures 3 inches across, the two fleshy leaves being each about 1 inch long by 2 inches broad. Other representatives of the genus belong to the shrubby group, one of these, which unfortunately died in transit, was a seedling from a bush which Professor Pearson describes in a letter to Sir Joseph Hooker as follows:—"It is a spreading bush with rather thick cylindric leaves 1–2 inches long. The bush frequently attains a height of 15 feet. When not interfered with by neighbouring vegetation a single bush may be 20 feet in diameter. The main stem is a woody trunk 9 inches or more in diameter." It is particularly unfortunate that the specimen of this giant *Mesembryanthemum* did not reach England alive. Another specimen received may possibly be the remarkable *Mesembryanthemum Barklyi*, N. E. Br. (Bot. Mag. t. 1820), the 'great ice-plant' mentioned by Sir Henry Barkly in a letter to Sir Joseph Hooker in 1876 and which has never yet reached England alive in spite of several attempts at its introduction.

One *Mesembryanthemum* (No. 6209), whose old leaves are retained in a membranous condition, is of some economic importance, since a decoction of its leaves is said to be used as horse medicine and also, when fermented, as an intoxicating drink.

Crassulas also are well represented, some shewing a habit of growth very similar to that of the two-leaved Mesembryanthemums. Among the species at present determinable may be mentioned *Crassula Barklyi*, in habit similar to *C. pyramidalis*.

Good specimens of *Anacampseros papyracea* have also been received.

Other plants of particular interest are several apparently new Stapelias, one or two species of *Hoodia* (?), and some striking specimens of a pyramidal succulent species of *Euphorbia*, in general appearance not unlike a small densely-packed plant of Brussels sprouts. A few peculiar species of *Sarcocaulon*, some Aloes and three plants of tuberous Pelargoniums, are also included in the collection.

Professor Pearson writes that he collected the first batch of specimens on his journey from Van Rhyns Dorp to O'okiep, Namaqualand. Later consignments came from Bethany Drift, not far from Drège's locality "Verleptcraam," and from Bushmanland.

The collection received from Professor Pearson includes over 100 specimens, the majority of which represent distinct species. Kew is very much indebted to Professor Pearson for this interesting collection, which is one of the finest living collections of South African succulents that have ever reached this country.

The Use of Carbon Bisulphide.—Some time ago a *Begonia*, supposed to be attacked by eelworms, was brought into the Jodrell Laboratory. On washing away the soil the root presented the appearance of a spongy mass, and numerous minute white worms were present in the crannies and cavities. Similar worms were also present in yet greater numbers in the cavities in the interior of the mass. On examination the parasite proved to be *Fridericia bisetosa*, Levinsen, one of the Oligochaet worms, several of which feed on living plants

and in some instances prove highly injurious. *F. bisetosa* often attacks larch seedlings when about a year old; the cortical tissue of the root is gradually eaten away, leaving the central woody portion exposed. It has also been met with in flower beds containing roses and pansies. In the case of the *Begonia*, patches of the cortex of the root had been completely destroyed, and wound-tissue formed around the wounds had been in turn attacked by the worms. This alternation of destruction and replacement of the tissues resulted in the formation of a somewhat tuberous spongy mass. At this stage the leaves had commenced to wilt, and the plant was evidently slowly dying owing to the failure of root action.

A second healthy *Begonia* was infected by placing cut up portions of the diseased spongy mass containing worms round the root of the healthy plant and afterwards planting it in sterilised soil. After the expiration of a month the leaves of the infected plant showed

signs of wilting, and on examination the cortex of the root was found to be destroyed in places by the worms which were present in considerable numbers. After examination the plant was re-potted and the soil treated with carbon bisulphide, as Theobald has stated that the worms are killed by this substance. One dram of carbon bisulphide was poured on to the "crocks" through the drainage hole at the bottom of the pot. Three days after this treatment the lower leaves of the *Begonia* commenced to wilt and bleach, and at the expiration of a week all the fully grown leaves were quite colourless and collapsed. At this stage the plant was removed and all the worms were found to be dead.

The use of carbon bisulphide having been proposed as a cure for eelworm, &c., attacking pot plants, the disastrous result of this substance on the *Begonia* suggested further experiments. In order to test its effect on the plants themselves, six different varieties of *Pelargonium*, well-established in pots of the size known to gardeners as "forty-eights," were treated. Three pots received one dram of carbon bisulphide each, the other three pots half a dram each. At the expiration of three days the lower leaves of each of the six plants were very flaccid and almost bleached, and at the end of a week after the application of the carbon bisulphide, all the full-grown leaves on every plant were bleached and dead. The plants were not, however, killed outright. Afterwards two plants, a *Begonia* and a *Ulex*, were each treated with three drops of carbon bisulphide, and in this instance neither plant showed any sign of injury. In every experiment the carbon bisulphide was introduced into the soil through the drainage hole at the bottom of the pot by pouring it on the "crocks," so that it did not come in contact with the root of the plant in liquid form. It is usually stated that this substance is not at all injurious to plant life if the root does not come in contact with the liquid, and this statement would appear to be true if the substance is used with care and in small quantity.

The above experiments suggest that it would not be wise to attempt the treatment of pot plants in vigorous growth with carbon bisulphide with the object of eradicating eelworm, &c.

Fridericia bisetosa is snow-white, as slender as thread, equal in thickness throughout, and about three-quarters of an inch in length. It occurs in old horse-dung, among rotten leaves, &c., and probably from such sources finds its way into the soil used by gardeners.

The treatment of such leaf-soil, &c., with carbon bisulphide some time before it is used would be a wise precaution. The same remark applies to the soil introduced into tomato-houses, &c.

In dealing with carbon bisulphide it is very important to remember that it is highly inflammable, the heat from a lighted cigarette being sufficient to cause an explosion.

G. M.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin :—

Messrs. John Yates & Co., Aston Manor, Birmingham.—Set of axes and other tools for the Forestry Museum.

Dr. Walter G. Fry, Hammersmith.—Section of trunk of grafted Elm, shewing union of stock and scion.

Mr. T. J. M. More, Linley Estate, Shropshire.—Specimens of timber of Larch, Spruce, Scots Pine and Oak.

Mrs. Porterfield, Chiswick.—Model of an Indian Temple made of Shola wood (*Aeschynomene aspera*).

Lord Arthur Browne, Westport, Ireland.—Cones of *Saxegothea conspicua*.

Monsieur Jules, Borgeaud, Oran.—A collection of ropes, cordage and other articles made of Halfa (*Stipa tenacissima*).

Mr. H. M. Imbert-Terry, Strete Ralegh, Exeter.—Branches with cones of *Larix Griffithii*, and *Saxegothea conspicua*.

The Right Honourable the Earl of Ducie, Tortworth Court, Gloucestershire.—Photograph showing *Quercus Aegilops* and *Nothofagus obliqua*.

Mr. J. H. Maiden, F.L.S., Director, Botanic Gardens, Sydney, New South Wales.—Sample of Brown Mallet bark (*Eucalyptus occidentalis*, var. *astringens*).

Dr. John C. Willis, F.L.S., Director, Royal Botanic Gardens, Peradeniya, Ceylon.—Fruits of *Theobroma Cacao* and of *Theobroma pentagona*.

Mr. W. H. Johnson, F.L.S., Director of Agriculture, Ibadan, Southern Nigeria.—Roots of Awun (*Alstonia congensis*) and of Afe (*Trema africana*), also herbarium specimen and sample of Igara peas (*Vigna Catiang*) and of Akpakapakera beans (*Phaseolus lunatus*).

Dr. Alexander Galt, Royal Scottish Museum, Edinburgh.—Package containing the powdered roots of Mutonga (*Solanum* sp.) and of Mohukona (*Chlorocodon Whyteii*) worn round the neck as a charm against various ailments by the natives of Ukambo Province, British East Africa.

Mr. Paul Koenig, Director of Forests and Botanic Gardens, Mauritius.—Fruits of *Theobroma Cacao*.

Mr. Joseph Jones, Curator, Botanic Station, Dominica.—Fruits of *Theobroma Cacao*, *T. bicolor* and *T. pentagona*, also cured "beans" of the two latter, known respectively as Tiger Cacao and Alligator Cacao.

Mr. H. C. Slingsby, Old Street, London, E.C.—Four models of timber trucks and trollies.

Mr. R. Gill, Curator, Agricultural Department, Southern Nigeria.—Several examples of carved cocoanuts.

Messrs. Merryweather & Sons, Ltd., London, S.E.—Photographs showing trees affected with Beech Coccus, and of methods of spraying.

Mr. H. B. Rogers, Hexworthy, Launceston, Cornwall.—Triangular section from the trunk of a Lucombe Oak.

Mr. and Miss Hipkins, Kensington, W.—A series of miscellaneous articles from the collection of the late Mr. A. J. Hipkins, F.S.A.

Mr. W. K. Stacey, Newgate Street, London, E.C.—Three rubber-tapping implements.

Mr. L. McHale, Manchester.—Podoa or pruner used in Cacao Plantations, St. Thomé.

Mrs. Maclagan, Queen's Gate Place, S.W.—Fruit and model of fruit of *Stephanotis floribunda*. The fruit was grown in the stove at the Palace, Bishopthorpe, in 1897, and was preserved by the late Archbishop Maclagan.

Messrs. R. Webb & Sons, Brush Manufacturers, Chesham.—A series of specimens to illustrate the various stages in the manufacture of brushes.

Messrs. Stafford Allen & Sons, Long Melford, Suffolk.—Dried roots of *Atropa Belladonna*, *Valeriana officinalis* and *Taraxacum officinale*.

Captain H. Rogers, R.N., Hartley, Plymouth.—Four sections of the wood of *Pinus insignis*.

J. M. H.

Neolitsea, *Merrill*.—In 1831 Nees in Wallich's Plantae Asiaticae Rariores, vol. ii. p. 64, based on *Litsea zeylanica*, C. & Fr. Nees, and on a few closely allied forms, a distinct Lauraceous genus, *Tetradenia*, Nees. In 1880 Bentham and Hooker, in the Genera Plantarum, vol. iii. p. 161, once more referred *Tetradenia*, Nees, to *Litsea*, Lamk., treating the group of species which it includes as a distinct section. Having regard to the circumstance that in 1830 (Bot. Reg. sub t. 1300) Mr. Bentham had already established on a Labiate from Madagascar the valid genus *Tetradenia*, Benth., the authors of the Genera Plantarum substituted the name *Neolitsea*, in a sectional sense, for the name *Tetradenia*, Nees. In dealing with this section in the Flora of British India, vol. v. (1886), pp. 155 and 178, Sir J. D. Hooker remarked that this section ought probably to be restored as the genus *Tetradenia*, Nees, and this restoration was made by Pax in Engler & Prantl, Naturl. Pflanzenfam. iii. 2. p. 119 (1891).

During the preparation of an account of the Malayan *Lauraceae* for the Materials for a Flora of the Malayan Peninsula the justice of Sir J. D. Hooker's and Engler and Prantl's conclusion became evident, and as a consequence two Malayan species which had to be described as new were published in this work (*Kew Bulletin*, 1910) as *Tetradenia mollissima*, Gamble (p. 366) and *T. kedahensis*, Gamble (p. 367). In doing this the fact was overlooked that Mr. E. D. Merrill had already come to the same conclusion as Pax, but that, following the indication already given in the Genera Plantarum, he had recognised that the restoration of Nees' genus involved *pari passu* the substitution of the name *Neolitsea*, in a generic sense, for the name *Tetradenia*, Nees (Philipp. Journ. Sci., vol. i. (1906) p. 56). As a consequence of this the names *Tetradenia mollissima* and *T. kedahensis*, noted above, must be altered to and should be cited as *Neolitsea mollissima*, Gamble, and *Neolitsea kedahensis*, Gamble, respectively.

J. S. G.

Botanical Magazine for March.—The plants figured are *Rhododendron sutchuenense*, Franch. (t. 8362); *Primula Maximowiczii*, Regel (t. 8363); *Meconopsis simplicifolia*, Walp. (t. 8364); *Clematis montana*, Bach., var. *Wilsonii*, Sprague (t. 8365) and *Cirrhopetalum longissimum*, Ridl. (t. 8366).

The Rhododendron is a handsome species collected by Mr. E. H. Wilson, and found in Szechuan and W. Hupeh. Unlike most of the broad-leaved species, *R. sutchuenense* flowers when only a small plant. As it flowers in early March, it is liable to damage from frosts. Since *Primula Maximowiczii* was first described over thirty years ago, it has been eagerly desired for cultivation, and the plant has at last been sent home by Mr. W. Purdom collecting for Messrs. J. Veitch & Sons, in the mountains of Northern Wei-chang. The plant figured has striking orange-crimson flowers, but in some specimens the colour appears to be purple. The flowers are pendulous with narrow corolla lobes. The *Meconopsis* is a native of the high Himalayan Alps from Central Nepal to Bhutan, etc. The flower is a very remarkable shade of blue. The species most nearly resembles *M. quintuplinerria*, Regel, from N. W. China, while its habit agrees with that of *M. pseudo-integrifolia*, Prain, from Tibet. *Clematis montana* is widely spread in the Himalaya and in the mountains of West and Central China, and there are numerous varieties. The subject of the plate is a native of Central China where it was collected by Mr. Wilson, and flowered in Messrs. J. Veitch & Sons' Coombe Wood Nursery in July, 1909. Besides the structural difference between this plant and *C. montana*, it is of particular value for gardens since it flowers at least two months later than the typical *C. montana*. The *Cirrhopetalum* was found near Panga, Siam, by Mr. Curtis, and was first flowered at Penang in 1893. The plate was prepared from a specimen sent to Kew by Sir Trevor Lawrence, with whom the plant flowered in 1909. This species is remarkable in the length of the lateral sepals which may reach a length of upwards of a foot.

Dominica Botanic Station Reports.—The reports of the Botanic Station, Experiment Plots and Agricultural School, Dominica, for the year 1909–10, is of an interesting character, and the station appears to be in a thoroughly efficient condition. Para rubber has been found to thrive well on the coast lands and there is a considerable demand for seeds in the island. The report of the Experimental Plots is of more than local interest and deals with manurial experiments on Cacao which have now been carried on for about ten years. They deserve careful study by those engaged in the cultivation of this product. The experiments show a considerable increase in the yield of Cacao in consequence of the application of manures and the most successful treatment appears to be a mulch of grass and leaves.

Botanic Station, Carriacou.—We notice with interest that a small Botanic Station has been opened on the Island of Carriacou in in connection with the Botanic Station, Grenada, and under the charge of Mr. G. Whitefield Smith, F.L.S., the Commissioner of the Island. A short report of the station is given in the Report of the Botanic Station, Grenada, 1909–10. The Cacao crop in Grenada is reported as the largest on record, and though mealy bug and black blight are stated to be slowly spreading, every effort is being made locally to cope with these pests.

Agriculture in Moçambique.—We have received from Mr. M. T. Dawe, Director of Agriculture, Moçambique, a summary of his Report on a recent visit to the farming districts of Chimoio and Manica in the Moçambique territory. As Mr. Dawe's Report is likely to prove of interest outside the Portuguese dominions, the summary is reproduced in part in the following pages.

"The primary object of my tour, seeing that I have only recently taken over the duties of Director of the Agricultural Department, was to gain an acquaintance with the nature of the country, and the general conditions of agriculture which obtain in this territory.

"Leaving Beira by train, one passes through the low-lying coast belt, which is, in the main, sandy and unfertile, yet heavily wooded. Gradually, however, one merges into better and still better land, and at Mandegos one is in the centre of a very rich and promising agricultural district. The area of land that has already been taken up for farming in Chimoio, in the immediate vicinity of the railway, is very considerable. The soil varies remarkably; even within very limited areas one may find several types of soil, generally red or black loamy soil, but the tendency in most cases is on the sandy side. In Manica, however, in the valley near Macequece, the soil is more uniform, particularly in the alluvial lands, where it is generally very deep and fertile.

"In the Chimoio district, particularly in the vicinity of Mandegos, the country does not lend itself to irrigation, and dry-farming is almost exclusively practised. In Manica, however, water is abundant in the high lands near Macequece, most of the farms being supplied with water from the hills for irrigation. In the Revue Valley as many as three crops per year can be reaped.

"The principal crop cultivated is maize; with but few exceptions, no attempts have been made in the cultivation of other crops on any extensive commercial scale. The methods of farming are, in the main, primitive. The majority of the farmers cultivate by hand labour, but a few older established and more advanced farmers work mainly with ploughs and oxen. Many, however, do not possess the necessary capital to enable them to prepare the land ready for ploughing. The nature of the country where farming is generally carried on is dense woodland, and to clear it ready for mechanical cultivation involves a heavy expenditure. I am informed that it costs £12–£15 per hectare, in many cases much more, to clear and stump such land ready for ploughing. It follows that the farmer who cannot afford the initial outlay to stump his land, can only cultivate by hand labour between the tree stumps. The result of such a method is (a) increased cost of cultivation, and (b) reduced crop yield by reason of imperfect and inadequate preparation and cultivation of land. . . . . .

"I was much impressed with the apparent suitability of the soil and climate of parts of Chimoio and Manica to the cultivation of wheat and barley, and I think that in certain lands they should thrive well. It is inadvisable that farmers should devote the whole of their attention to maize. Wheat and barley should prove more remunerative than maize, although, of course, it requires

more attention in cultivation. Certain farmers whom I met, who have had considerable experience in wheat in other countries, agree with my views and are very anxious to give wheat a trial. It is necessary to prove by experiment the most suitable month to sow the seed, and in order not to lose a year, two tons of seed wheat and one of barley have been ordered by cable from the Cape. . . . . .

"I am rather surprised that more use is not made locally of native timber. There is timber suitable for almost every building purpose in this territory. Excellent building stone, excepting probably in the coast lands, is generally easily available, and good bricks and tiles may be easily made, yet wherever one goes, with but few exceptions, one meets with unsightly and unwholesome buildings of corrugated iron and imported perishable pine wood. Excellent wood for making shingles for roofing is being burnt daily in Chimoio on the farms, and yet I have not noticed a single house roofed with shingles. Houses built of stone or brick, and roofed with tiles or shingles are generally 10 degrees or more cooler than corrugated iron houses. *It would be in the general* interests of the country, and of health, if more decided efforts were made to develop the building resources of this country.

"As I have before mentioned, considerable areas of the most fertile land along the railway have already been leased. Large areas of excellent agricultural land are still available, adjacent to the railway blocks and in other localities, and I would urge that steps should be taken to endeavour to attract settlers who possess the capital necessary for the proper development of the land. . . ."

Para Rubber in the Malay Peninsula.—A translation of a valuable paper by Dr. P. J. S. Cramer, Director of Agriculture, Surinam, is given in the Proceedings of the Agricultural Society of Trinidad and Tobago, Vol. ix., Part i, January, 1911, under the title of "The Culture of Hevea in the Malay Peninsula." The article originally appeared under the title "De Rubbercultuur op het Maleische Schiereiland" in Bulletin No. 25 of Department Van Den Landbouw, Suriname, August 25th, 1910.

The author, at the request of the Dutch Government, made an extended tour of rubber estates in the Malay Peninsula and Ceylon during the latter part of 1909, and from observations and notes made at the time he has produced in terse language a work which, as stated in the preface, is not intended as a study of the cultivation of *Hevea* in the Straits in general, but only as a manual for the planter. The matter covers some 130 pages, and embraces the whole subject from the selection of a site, suitable soil, drainage, planting, upkeep of a plantation, catch crops, diseases and pests, tapping operations, etc., to the packing of the finished product for export.

The work is well illustrated, and should form a valuable addition to the literature dealing with this important industry.

J. M. H.

Crown-Gall and Hairy-Root.—In connection with the article on Crown-Gall recently published in the *Bulletin* (*K.B.*, 1910, pp. 309–312) it is of importance to call attention to the researches of Dr. George G. Hedgcock on Crown-Gall and Hairy-Root of the apple tree published at the close of last year by the U.S. Department of Agriculture (U.S. Dept. Agric. Bull. No. 186).

Dr. Hedgcock has conducted a very comprehensive series of experiments, extending over several years, bearing on the disease known as "Crown-Gall" in the United States, and also on the abnormal development called "Hairy-root," occurring on the roots and above-ground parts of apple trees. He concludes that the two diseases, although so very dissimilar in general appearance, are in reality due to the same organism, and that the disease can be conveyed from apple trees to various other kinds of fruit trees. "Hairy-root," as the name denotes, is characterised by the excessive development of slender, fibrous roots, either on the branches of the root or on the stem, and they often originate from the galls themselves. This form of the disease appears to be unknown in this country, but has been noted on the Continent.

In nurseries where trees are propagated by budding and root-grafting, as compared with seedling nurseries, there is a much greater percentage of disease, and on trees grown from root-grafts there is more disease than on those propagated on seedlings by budding. This is due to the infection of the plants through the callus formed at the junction of the graft. The relative amount of callus formed depends on the accuracy in grafting. When close-fitting root-grafts are made, avoiding blunt ends of root and scion, which should be approximately of the same diameter, but little callus is formed. The wrapping used should consist of cloth, and should cover the union completely, and should hold the parts firmly together until the graft is planted, then it should rot away when growth begins.

Heavy wet soils have been found to favour an increase of the disease.

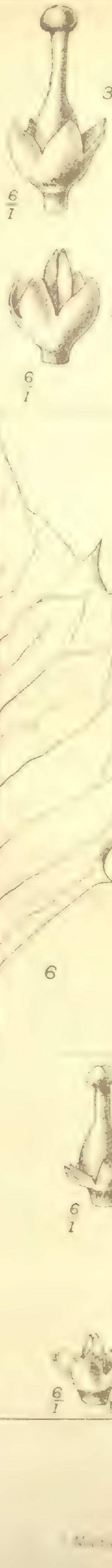
A more recent and voluminous Bulletin entitled "Crown-Gall of Plants ; its cause and remedy" (U.S. Dept. Agr., Bureau of Plant Industry, Bull. No. 213, 1911) embodies the researches of Dr. Erwin F. Smith, Nellie A. Brown and C. O. Townsend.

Overwhelming evidence as to the bacterial nature of the disease is produced. The organism is named *Bacterium tumefaciens*.

Crown-Gall is a common disease in nurseries on the roots and shoots of various orchard trees and other plants. The disease progresses slowly, first stunting the plant and finally killing it. The great number of plants, belonging to widely separated families, susceptible to this disease, and the facility with which the germs from one plant can infect another plant belonging to a different family favour its rapid extension unless great care is exercised.

The measures recommended for dealing with the disease are mainly of a preventive nature and include the strict inspection of nursery stock, condemnation of all diseased shrubs and trees and sterilisation of infected soils.

G. M.



A-Osmanthus Aquifolium.
B-O. Fortunei, C-O. fragrans.

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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4. 1911

XVIII.—OSMANTHUS AQUIFOLIUM AND O. FORTUNEI.

O. Stapf.

For a long time two plants have been in cultivation under the name of *Osmanthus Aquifolium*. Horticulturists have been aware of it, and twice an attempt has been made to discriminate between them and to define them technically, but with so little success that no notice was taken of it in systematic and floral works. This was no doubt due to the fact that the distinctions relied upon were taken from the leaf characters which by most authors were considered as extremely variable, and therefore unsuitable. Although a considerable variability in size, shape and degree of dentation of the leaves cannot be denied, there are limits to it which allow us to recognise two types of leaves which are moreover constantly correlated with floral characters, and in this way make it possible to distinguish two well-defined units within what is commonly called *Osmanthus Aquifolium*.

The name *Osmanthus Aquifolium* appears for the first time in Siebold and Zuccarini, "Florae Japonicae Familiae Naturales," sect. alt. (1846) p. 42, as a synonym of *Olea Aquifolium*, Sieb. and Zucc., the paragraph running thus:—"*Ilex Aquifolium*, Thunb. Fl. Jap. p. 79. *Il. Aquif.* var. *heterophylla*, Ait.? Blume Bijdr. p. 1150.—Koo Kotz vulgo Firaggi, Kämpf. Amoen. p. 781.—*Olea ilicifolia* Hasskarl in Catal. hort. Bogor. p. 118.—*Osmanthus Aquifolium* Sieb. in litt." All these synonyms refer to the plant generally known in Japan as "Firagi" or "Hiragi." The excellent figure of it in Honzo Zufu (1828), vol. 88, fol. 1, leaves no doubt as to what this "Hiragi" is. It has elliptic to oblong-elliptic or lanceolate-elliptic leaves with mostly 3—or sometimes 1 or 2 or 4—large spinescent teeth on each side, and they are commonly 4–5 cm. long and 2·5 cm. wide. Occasionally the leaves are quite entire, and then frequently more lanceolate. The teeth vary from 0·5 to 1 cm. in length. The flowers measure about 8–9 mm. in diameter, the calyx segments are ovate, and subobtuse to almost acute, the petals oblong, 4–5 mm. by 2–2·5 mm., the filaments more than half the length of the petals, and distinctly

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longer than the anthers, the whole stamens almost equalling the petals in length, and the capitate stigma, which is borne on a slender style, stands over 3 mm. from the base of the flower. Beside these hermaphrodite flowers, there occur also male flowers in which the pistil is reduced to a short conical body, shortly exserted from the calyx and terminating in a more or less bifid point, whilst the anthers are somewhat longer, so that their tips reach or protrude beyond those of the petals. The two types of flowers are found in separate individuals to judge from the herbarium material, but it is probable that this separation is actually not so absolute, and that among the apparently hermaphrodite flowers functionally female ones also occur. An imperfect diclinism of this kind is not uncommon in *Oleaceae*. A very good figure of *Osmanthus Aquifolium*, as defined here, may be found in Shirasawa's Iconographie des Essences Forestières, vol. i, tab. 82.

The plant was in cultivation in Buitenzorg in the twenties of the last century according to Blume (l.c.), but does not seem to have found its way into Europe until 1856, when T. Lobb introduced it from Japan for Messrs. Veitch & Sons, who advertised it in 1858 as *Olea ilicifolia* (Gard. Chron. 1858, p. 419, advert.; Veitch, Hort. Veitch, p. 404). This disposes of Bretschneider's statement that the plant was introduced by Fortune, in so far as the true *Osmanthus Aquifolium* and Fortune's claim to having it introduced into Europe for the first time is concerned; but Fortune no doubt saw it in Japan in 1860, and brought specimens with him to England in 1862. There is a sample of it in the Kew Herbarium, collected by him in gardens at Yedo in November, 1860, and plants of the variegated form imported by him for Standish were exhibited by that firm in the summer of 1862 (Gard. Chron. 1862, p. 240).

It appears, however, that Fortune also brought with him another *Osmanthus* which he himself had apparently not recognised as distinct from *O. Aquifolium*, and which under that name was distributed from the English nurseries. A plant of it came into Carrière's hands, and he at once pointed out that it was a new and distinct species which he named *O. Fortunei* (Rev. Hort. 1864, pp. 69–71 with fig.). Carrière said that Fortune brought it from China, and a specimen in the Hookerian collection at Kew, received from "Hort.-Veitch" and described as "e China" seems to confirm his statement. But as we now know that *O. Fortunei* is also cultivated in Japan, and Fortune took his collection of living Japanese plants home viâ China, and furthermore, as *O. Fortunei* has not since been observed in China, he may very well have got it from a garden in Japan.

The differential characters of *O. Fortunei*, which is only known in the male state, rest on the leaves as well as the flowers, and may be diagnosed as follows :—

Leaves elliptic, usually with numerous (8–12) pungent teeth on each side, occasionally entire or with a very few small teeth, and commonly 7–10 cm. long, 4–7 cm. wide; teeth 0·3–0·5 cm. long. *Flowers* about 7 mm. in diameter. *Calyx* segments rotundate, truncate, the hyaline margin minutely erosulate. *Corolla* segments obovate-oblong, 3 mm. long, 2 mm. wide. *Filaments* as long as or rather shorter than the anthers, the whole stamen distinctly

shorter than the petal. *Rudimentary pistil* conical, slightly exceeding the calyx, the pointed apex shortly bifid. *Ovules* present, but never developing.

Although Carrière's description and figures ought to have been sufficient to keep the two plants distinct, they were sold and grown indiscriminately as *Osmanthus Aquifolium* or *O. ilicifolius*. In 1876, a good figure of *O. Fortunei* was published in the Gardeners' Chronicle of Nov. 25 (p. 689), accompanied by analyses of the flower, showing clearly the erosulate truncate calyx segments, the short filaments and the rudimentary pistil, but the name applied to it was *Osmanthus Aquifolium* with the synonyms *Osmanthus ilicifolius* and *Olea ilicifolia*. In the following year, however, the correct appellation of the plant having been challenged, the figure was reproduced in the Gardeners' Chronicle (Feb. 24, p. 239) and the synonymy was rectified in so far as *Olea ilicifolia* was retained as a synonym, whilst *Osmanthus ilicifolius* of the nurseries was proposed to stand "for garden purposes" as a name for the "more deeply cut form" which "botanists will with greater propriety call . . . *Osmanthus Aquifolium* var. *ilicifolius*." A figure was added of a leaf of the latter which makes it perfectly clear that this *O. ilicifolius* is the 'Hiragi' of Japan, that is the genuine *O. Aquifolium*. Yet the authors of the note themselves thought so little of those "forms" that they considered it doubtful whether botanists "would think it worth while to keep up such a variety," and in another passage actually say that "the so-called *O. ilicifolius* is the same as *O. Aquifolium*," adding "that in the wild plant it is easy to pick leaves of both so-called species from the same bough." There is no justification for this statement so far as herbarium specimens go. nor is there any evidence that either Lobb or Fortune, who might have supplied the information, ever collected those species of *Osmanthus* in the wild state. In fact, *O. Fortunei* is still unknown in that state, and *O. Aquifolium* is so generally cultivated in Japan, and apt to run wild, that even Japanese botanists were until recently doubtful as to its spontaneous occurrence. Further, the authors themselves admit that "in British gardens the two plants maintain their distinctive characters, and do not as yet manifest any such sporting tendency as we have mentioned." Nor have they done so since, and in so far there would seem to be no reason why *Osmanthus Aquifolium* and *O. Fortunei* should be treated otherwise than as distinct species. Subsequently the figure of *O. Fortunei* published in the Gardeners' Chronicle (sub *O. Aquifolium*) was reproduced in Regel's Gartenflora (1879), p. 276, and in Dippel's Laubholzkunde, vol. i. (1889), p. 140, under *Olea aquifolia*, but no new information was added.

Some fresh light is thrown on the origin of *O. Fortunei* by an observation by Makino concerning *O. japonicus*. Of this Makino (Bot. Mag. Tokyo, vol. xvi., 1902, p. 31) says "= ? *O. Aquifolium* × *fragrans*" and after a very full description of the plant, again on p. 32 "This may be the hybrid between *Osmanthus Aquifolium*, Sieb. and *O. fragrans*, Lour., as given above, having leaves and flowers which are just intermediate to them. It is only known in cultivation." Now this *O. japonicus* is the *O. Fortunei* of Carrière. That this is so is evident from the description

Makino gives of *O. japonicus*, which he also says is only known in the male state, and from the fact that when in a later paper (Bot. Mag. Tokyo, vol. xxiii., 1909, p. 14) reducing *O. japonicus* to a var. of *O. Aquifolium*, he quotes the figures in Regel's Gartenflora (1879), p. 276, and Dippel's Laubholzk., vol. i. p. 140, as representing this plant. Those figures, however, are, as has already been pointed out above, actually figures of *O. Fortunei*. So far as the morphological characters of *O. Fortunei* are concerned, much may be said in favour of the hypothesis of its hybrid origin, although it cannot be considered as proved until the same plant is actually produced by crossing the two assumed parents, which should be easy enough; or until it is found growing among them in a natural state, and under conditions which are equivalent to an experimental proof.

Some support of Makino's theory might also be deduced from the Japanese names of the species involved, *O. Aquifolium* being "Hiragi," *O. fragrans* "Mokusei" and *O. Fortunei* "Hiragi-Mokusei."

Makino, as has been stated above, treated *O. japonicus* in a later paper as a variety of *O. Aquifolium*, but as he does not give any reasons for doing so, it may be sufficient to refer here to what has been said above regarding the differences between *O. Aquifolium* and *O. Fortunei*, and to distinguish them under those names whether the latter should in the end prove to be a hybrid or not. The use of the name *O. Fortunei*, which is not referred to by Makino, in the place of *O. japonicus* requires some explanation. *Osmanthus japonicus* was mentioned first by Siebold in his Synopsis Plantarum Oecon. Regni Japonici [in Verh. Batav. Gen., vol. xii., 1830, p. 36]. It appears there merely as a name for some tree which is much valued in Japan on account of its wood and fragrant flowers and known there as "Hiraki-mok'sen." Then we have it again as a mere name in Hasskarl's Catalogue Pl. Hort. Bogor (1844), p. 118 in the version "*Olea japonica* Sbld. (sub *Osmanthus*) Hiraki-mok'sen, and again as "*Olea japonica*" in Siebold & Zuccarini Florae Japonicae Familiae Naturales in Abh. Akad. Münch., vol. iv. 3, p. 176 (p. 43 of the reprint). The first description of it is Makino's in 1902, who quotes Hiragi-mokusei (evidently the correct translation of the Hiraki-mok'sen of Siebold) as its vernacular name. *O. Fortunei* (1864) has therefore undoubted priority. Other names which were used in connection with *Osmanthus Aquifolium* are "*Ilex Aquifolium* v. *heterophylla Ait.*," quoted with a ? by Blume, Bijdr., p. 1150 and *Ilex heterophylla*, Don. Gen. Syst. ii. p. 17 (1832). As to the first, Aiton's var. *heterophylla* of *Ilex Aquifolium* was a true *Ilex Aquifolium*, and as to the other, it was a mere book-species formed under the impression that Blume's plant was an *Ilex* which deserved specific rank, whereas Blume actually described an *Osmanthus*, but suggested, as we now know erroneously, that it might be Aiton's *Ilex Aquifolium* var. *heterophylla*. The accompanying plate is intended to bring out the essential characters by which *O. Aquifolium* and *O. Fortunei* may be distinguished, and also the intermediate position of the latter between *O. Aquifolium* and *O. fragrans*.

Cultural Notes.

Mr. Bean has supplied a few notes as to the culture and general habits of the plants under discussion.

Osmanthus Aquifolium is a very useful hardy evergreen, forming a rounded bush up to 8 feet in height, and as much in diameter. With the general aspect of a small-leaved holly, it is of more graceful form and, from its dwarfer habit, is better adapted for positions where space is restricted. It has produced under cultivation several variegated forms, but the best of its varieties is *atropurpureus* ; this was raised at Kew in the "seventies" of last century. The whole shrub has a purple tinge, and the quite young twigs and leaves in their black shininess have the aspect of having been dipped in tar. It is, in our experience, the hardiest of all the forms.

Dr. Stapf observes that the leaves of the species are occasionally entire. Such leaves occur on all plants that are old enough ; they are characteristic (as in the holly) of the adult condition, but they only occur on the upper part of the shrub. Twigs, taken off and rooted, remain constant and make neat bushes ; they are sold by nurserymen as *O. myrtifolius*. All the forms flower in autumn and their clustered, small, white flowers are very fragrant. Propagation is best effected by means of cuttings in late summer, giving them mild bottom heat. The practice of grafting this shrub on the oval-leaved privet is unnecessary and objectionable.

O. Fortunei, as might be inferred from the supposed parentage given above, is not quite so hardy as *O. Aquifolium*, for one of the parents (*O. fragrans*) is a cool greenhouse shrub. It has, nevertheless, survived over 30° of frost at Kew, and although the trying winter of 1908–9 denuded our plants of all their leaves, the same happened to holm oaks and other evergreens, and, as with them, the *Osmanthus* quite recovered in the following summer. It can be increased by cuttings like *O. Aquifolium*, but does not strike root so readily. All the forms like a good open loamy soil, and thrive best in a sunny sheltered position.

Explanation of Plate.

A. *Osmanthus Aquifolium*. 1, leaf ; 2, hermaphrodite flower ; 3, calyx and pistil of same ; 4, male flower ; 5, calyx and rudimentary pistil of same. B. *O. Fortunei*. 6, leaf ; 7, male flower ; 8, calyx and rudimentary pistil of same. C. *O. fragrans*. 9, leaf (dentate state) ; 10, hermaphrodite flower ; 11, calyx and pistil of same ; 12, male flower ; 13, calyx and rudimentary pistil of same.

XIX.—DIAGNOSES AFRICANAE: XLI.

1251. **Loranthus (Ischnanthus) triplinervius**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 385, anglice, ined. [Loranthaceae - Eulorantheae] ; affinis *L. Holstii*, Engl., a quo foliis triplinerviis, umbellis 4–6-floris recedit.

Ramuli graciles, glabri, dense lenticellati, purpureo-brunnei vel pallidi. *Folia* opposita, subsessilia vel breviter petiolata, lanceolata vel elliptico-lanceolata, recta vel subarcuata, apice obtusissima vel subacuta, basi cuneata, 3·2–4·4 cm. longa, 0·8–1·6 cm. lata, chartacea, glabra, paullo supra basin distincte trinervia ; petioli usque ad 2 mm. longi, glabri. *Umbellae* solitariae, 4–6-florae ; pedunculus 1·5–2 mm. longus, glaber ; pedicelli 3 mm. longi, glabri ; bractea e basi cupulari elliptica, ciliata, extus glabra, margine dorsali 1·3 mm. longo inferne umbonato, margine ventrali 0·25–0·35 mm. longo. *Torus* circiter 1 mm. longus. *Calyx* subtruncatus, ciliatus, 0·35 mm. longus. *Corolla* pallide viridis, vix 1·2 cm. longa, in alabastro tetragona ; tubus 3 mm. longus ; lobi lineares, sursum ampliati, 7 mm. longi. *Filamenta* basi corollae loborum inserta, 4·5 mm. longa, linearia, dente 0·13–0·17 mm. longo ; antherae lineares, 3 mm. longae. *Discus* leviter obtuse 4-lobatus, 0·4 mm. altus.

Tropical Africa. German East Africa : Dar-es-Salam, *Kirk* ; *Holtz*, 553 ; *Stuhlmann*, 7614, 7666, 7667, 7673, 7790.

1252. **Loranthus (Ischnanthus) ramulosus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 386, anglice, ined. [Loranthaceae-Eulorantheae] ; affinis *L. Schlechteri*, Engl., a quo antheris longioribus recedit.

Planta ramosa, ramulis brevibus juventute minute puberulis demum glabris. *Folia* opposita, suborbicularia, elliptica, elliptico-oblonga vel lanceolata, apice obtusa vel subacuta, basi obtusa vel rotundata, 0·6–2·5 cm. longa, 5–9 mm. lata, tenuiter coriacea, glabra ; nervi laterales valde obliqui, utrinque 2–3 ; petioli 0·5–1 mm. longi. *Umbellae* solitariae, 4-florae ; pedunculus 2–2·5 mm. longus, apice excepto glaber ; pedicelli 2–2·5 mm. longi, tetragoni, glabri, in cavis paullo profundis ciliatis inserti ; bractea torum calycecum aequans, e basi cupulari anguste ovata, ciliata, extus sparse pilosa, margine dorsali 1·5 mm. longo, margine ventrali 0·4 mm. longo. *Torus* 1–1·3 mm. longus. *Calyx* subtruncatus, ciliatus, 0·25–0·35 mm. longus. *Corolla* 2–2·2 cm. longa, in alabastro tetragona ; tubus oblongus, 4·3 mm. longus, haud fissus, papillarum vitta angusta a sinibus decurrente ; lobi 1·7 cm. longi, lineares, sursum ampliati, infra $\frac{1}{3}$ reflexi. *Filamenta* basi corollae loborum inserta, 8–9 mm. longa, sursum angustata, in basin valde ampliata, inferne leviter sulcata, basi minute papillata, dente subulato 0·8–1 mm. longo ; antherae lineares, 6–7 mm. longae. *Discus* leviter 4-lobatus, 0·35 mm. altus.

Tropical Africa. British East Africa : between Mombasa and Takaunga, *Whyte* : between Mombasa and Lamu, *Whyte*.

1253. **Viscum (Ploionixia) decurrens**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 398, anglice, ined. [Loranthaceae-Visceae] ; species perdistincta internodiis superioribus conspicue applanatis ex apice ad basin angustatis, cymulis pedunculatis, petalis deciduis, bacca sessili.

Caulis teres, circiter 4 mm. diametro 23–37 cm. infra apicem ramulorum : rami biangulati, plus minusve compressi ; ramuli valde compressi internodiis linearibus deorsum leviter angustatis : internodia 2·5–5·5 cm. longa. *Folia* subsessilia, anguste obovata vel obovato-oblonga usque oblanceolata, apice rotundata, in basin

anguste cuneata, 2–5 cm. longa, 0·8–2 cm. lata, coriacea, glabra, distincte 3-nervia vel 5-nervia, subtiliter reticulata, nitidula ; petioli usque ad 2 mm. longi. *Cymulae* axillares et terminales, solitariae vel ternatae, pedunculatae, 3-florae, unisexuales. *Flores* monoici, tetrameri. *Cymula mascula* :—*Pedunculus* usque ad 3·5 mm. longus, circiter 0·5 mm. ultra cupulam bractealem productus. *Cupula bractealis* cymbiformis, 2·5 mm. longa, utrinque subapiculata. *Alabastra* ellipsoidea, 1·5 mm. longa. *Flos* 1·8 mm. longus, basi solida 0·35 mm. longa. *Torus* circiter 0·35 mm. longus. *Petala* ovata, circiter 1 mm. longa, 0·8–1 mm. lata. *Antherae* suborbiculares, 0·5 mm. diametro, vel ellipticae, 0·8 mm. longae, 0·5 mm. latae. *Cymula feminea* :—*Pedunculus* 4–6 mm. longus, ultra cupulam bractealem plus minusve productus. *Cupula bractealis* minute ciliata, utrinque acuta, tandem crescentiformis lateraliter visa. *Torus* subcylindricus, in basin leviter angustatus, 1·5 mm. longus, vix 1 mm. diametro, vel compressus, 1 mm. latus, 0·8 mm. crassus, laevis. *Petala* ovato-oblonga vel deltoideo-ovata, 0·7 mm. longa, 0·5–0·7 mm. lata. *Stigma* supra insertionem petalorum 0·25–0·3 mm. prominens. *Bacca* juvenilis oblongo-ellipsoidea.—*V. obscurum*, var. *decurrens*, Engl. in Engl. Jahrb. xx. 132 ; De Wild. Études Fl. Bas- et Moyen-Congo, i. 30, 237.

Tropical Africa. Lagos : Eppah, on Guttiferae, *Barter*, 3314. Southern Nigeria : by the Old Calabar River, on *Symphonia globulifera*, Linn. f., *Mann*, 2278. Gaboon : Munda ; Sibange Farm, *Dinklage*, 574 : by the Gaboon River, on *Symphonia globulifera*, Linn. f., *Mann*, 984. Lower Congo : near Léopoldville, *Gillet*.

V. decurrens is apparently allied to *V. nervosum*, Hochst. *V. obscurum*, Thunb., a native of South Africa, has a sessile inflorescence and long-pedicelled berries.

1254. **Viscum (Aspidixia) ugandense**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 405, anglice, ined. [Loranthaceae-Visceae] ; affinis *V. Engleri*, Van Tiegh., et *V. combreticolae*, Engl., ab hoc forma cupulae bractealis, ab illo bacca sessili distinguitur.

Frutex multiramosus. *Rami* ramulique conspicue applanati, in sicco costati ; internodia linearia usque oblanceolata, taeniiformia, superne latiora, apice leviter constricta, in basin leviter angustata, 1·6–5 cm. longa, 3–7 mm. lata, ea ramorum principalium secus lineam mediam valde incrassata. *Flores* dioici, tetrameri. *Inflorescentiae masculae* ex cymulis tribus trifloris (rarius bifloris) cupulis bractealibus suffultis constantes. *Cupula bractealis* sessilis, late alveata, 3·5 mm. longa, 1·8 mm. lata ; lobi patuli, rotundati, 1·8 mm. longi. *Flos* basi solida 0·25 mm. longa. *Torus* 1·3 mm. longus. *Petala* deltoideo-ovata, 1·3 mm. longa, 1·2–1·4 mm. lata, apice leviter recurva. *Antherae* ambitu elliptico-oblongae, 1·3–1·5 mm. longae, 0·7–0·8 mm. latae. *Inflorescentiae femineae* ex floribus 1 vel 3 cupulis bractealibus suffultis constantes. *Cupula bractealis* conspicue biloba, 1·8–2 mm. alta ; lobi ascendentes vel suberecti, 1 mm. longi, sub anthesi torum superantes vel subaequantes. *Torus* obovoideo-oblongus, 1·3 mm. longus. *Petala* 1·3 mm. longa, decidua, alia anguste triangularia, acuta, 0·8 mm. lata, alia deltoideo-ovata, 1 mm. lata. *Stigma* subsessile, 0·35–0·5 mm. supra insertionem petalorum prominens. *Bacca* sessilis, late ovoidea, 6 mm. longa, laevis.——*V. dichotomum*, Engl. Pflanzenw. Ost-Afr. C. p. 167 ; Rendle in Journ. Linn. Soc. Bot. vol. xxxvii. p. 207 ; non D. Don.

Tropical Africa. Uganda : Butumbi, 1900 m., *Stuhlmann*, 2179; Toro District, at 1350 m., on *Albizzia Brownii*, Walp., *Dawe*, 473 ; near Fort Portal, 1500 m., *Bagshawe*, 1094 ; Ruchigga, *Bagshawe*, 433.

The type of *V. ugandense* is *Dawe*, 473, from which the description of the female inflorescence and fruit has been drawn up. The male inflorescence has been described from *Bagshawe*, 1094, which comes from the same district and is apparently conspecific.

1255. **Viscum (Aspidixia) shirense**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 406, anglice, ined. [Loranthaceae-Visceae] ; affinis *V. Engleri*, Van Tiegh., a quo internodiis angustis apice vix contractis recedit.

Frutex multiramosus. *Caulis* teres, circiter 5 mm. diametro 45 cm. infra apicem ramulorum. *Rami* ramulique conspicue applanati, in sicco costati; internodia late linearia vel oblanceolato-linearia, rarius oblonga, taeniiformia, superne latiora, apice vix vel haud contracta, in basin plus minusve angustata, 1·2–3·7 cm. longa, 2–4·5 mm. lata, ea ramorum principalium secus lineam mediam valde incrassata. *Flores* dioici, tetrameri. *Inflorescentia mascula* :— *Flores* solitarii, sessiles. *Alabastra* ellipsoidea, 2·5 mm. longa, basi solida 0·5 mm. longa. *Torus* 0·8–1 mm. longus. *Petala* deltoideo-ovata, 1–1·3 mm. longa. *Antherae* obtuse trigonae, ambitu ellipticae, 1–1·3 mm. longae, 0·8 mm. latae. *Inflorescentiae femineae* ex floribus 1 vel 3 saepius cupulis bractealibus carentibus constantes. *Cupula bractealis*, dum adsit, sub anthesi basin tantum tori amplectens, sessilis, biloba, 1–1·3 mm. alta, 1·3 mm. longa ; lobi ascendentes, obtusissimi, 0·8 mm. longi. *Torus* pedicellocum obovoideo-oblongus, 1·8–2 mm. longus, 1·3 mm. latus. *Petala* luteo-viridia, oblongo-ovata, 1·3–1·5 mm. longa, 0·8–1 mm. lata, decidua. *Stylus* distinctus, brevis, crassus, compresso-quadrangularis ; stigma 0·8–1 mm. supra insertionem petalorum prominens. *Bacca* juvenilis pedicellata, aurantiaco-rubra, ovoidea.— *V. anceps*, Engl. in Engl. Jahrb. vol. xxx. p. 305, non E. Mey.

Tropical Africa. German East Africa : Unyika ; near Manyames Dorf, 1500 m., *Goetze* 1441. Nyasaland ; Mount Malosa, 1200–1800 m., *Whyte* ; near Mambane, 1200 m., *Kirk*. Portuguese East Africa : Gazaland ; Mossurize District, Mafusi, 1000 m., *W. H. Johnson*, 166 ; Mount Maruma, 1000 m., on *Albizzia*, etc., *Swynnerton*, 1085.

1256. **Hymenocardia grandis**, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *H. ulmoidi*, Oliv., sed foliis majoribus, stylis intus tomentosis, fructibus duplo majoribus differt.

Arbor magna, 30–50 m. alta ; rami teretes, cortice cinereo obtecti ; ramuli juniores fere glabri, angulares. *Folia* ovata, ovato-elliptica vel ovato-lanceolata, basi rotundata, apice breviter et obtuse acuminata, 6–10 cm. longa, 2–5 cm. lata, integra, membranacea vel tenuiter chartacea, utrinque glabra, nervis lateralibus utrinque 5–8 subtus leviter elevatis ; petioli 8–10 mm. longi, graciles, glabri ; stipulae minutae. *Flores* ♂ et ♀ ignoti. *Fructus* plani, late obovati vel orbiculares, basi brevissime cuneati, apice profunde emarginati, 3–4·5 cm. longi, 2·5–3·5 cm. lati, nucleo obliquo obovato infra medium sito circiter 1·3 cm. longo et 8 mm.

lato, alis membranaceis medio circiter 1·2 mm. latis minute parce puberulis striatis ; styli persistentes, tomentosi, vix 1·3 cm. longi ; pedicelli 8–10 mm. longi, minute parce puberuli ; stipes circiter 5 mm. longus.

Tropical Africa. Togo : Afem, *Kersting*, A. 515 ; Bagu, *Kersting*, 301 ; Njamassilä, *Kersting*, 157. Belgian Congo : Fort Beni, *Mildbraed*, 2421.

A very striking species with a curious distribution, Fort Beni being on the Uganda border of the Congo State, and widely distant from Togoland ; it is the only one besides *H. ulmoides*, Oliv., which has the wings connate around the base of the fruit-body.

1257. **Acalypha eriophylla,** *Hutchinson* [Euphorbiaceae-Crotoneae]; inter species Africanas stipulis magnis trilobatis bractea ♀ fere obtecta valde distincta.

Caules e rhizomate lignoso orti, erecti, simplices, usque ad 20 cm. alti, profunde canaliculati vel sulcati, pilis gracilibus patulis albis villosi. *Folia* caulium apices versus conferta, plus minusve imbricata, subsessilia, ovata vel ovato-elliptica, apice breviter caudato-acuminata, basi rotundata vel (in statu juvenili) paullo cuneata, 1·5–2·5 cm. longa, 0·7–1·4 cm. lata, acute serrata vel subdentata, chartacea, utrinque pilis longis albis dense villosa, nervis lateralibus utrinque prominentibus ; stipulae conspicuae, trilobatae vel tripartitae, 5–8 mm. longae, subcoriaceae, intus glabrae, extus pilosae, segmentis lineari-lanceolatis subacutis vel obtusis. *Flores* monoici, ♀ solitarii, ad basin pedunculi flores ♂ gerentis. *Inflorescentiae* in axillis veteribus ; ♂ pedunculi 2–4 cm. longi, pilosi. *Bracteae* glomerulos ♂ subtendentes, oblongo-lineares, 3 mm. longae, ciliatae. *Gemmae* rubrae, apice parce pubescentes. *Bractea* ♀ stipula fere obtecta, ad medium irregulariter lobata, extus parce pilosa, intus glabra, lobis subulatis pilosis non glandulosis. *Sepala* 3, oblongo-lanceolata, ciliata. *Ovarium* pilis albis dense hirsutum, non glandulosum ; styli graciles, 4 mm. longi, breviter laciniati. *Capsula* et semina non visa.——*A. pedunculoris*, var., Pax in Baum Kunene-Samb. Exped. p. 283, non Meisn.

Tropical Africa. Angola : on the Kubango, in the upper part of Massaca, *Baum*, 270.

A very remarkable species associated by Pax with *A. pedunculoris*, Meisn. The flowers are monoecious, the stipules large and trilobed, almost hiding the female flower at the base of the male axis, and the styles are free to the base, whilst in *A. pedunculoris* the flowers are dioecious, the stipules small and entire, and the styles connate in the lower part for half their length.

1258. **Erythrococca subspicata,** *Prain* [Euphorbiaceae-Crotoneae] ; species racemis femineis spiciformibus folia subaequantibus insignis.

Frutex ramulis glabris, cortice viridescente lenticellato ; gemmae perulatae squamis caducis. *Folia* petiolata, membranacea, ovato-oblonga, acuminata, basi cuneata, margine grosse denticulata, 10–12 cm. longa, 4–4·5 cm. lata, saturate viridia, glabra, nervi laterales utrinsecus circiter 4, subtus paulo elevati : petiolus glaber, supra canaliculatus, 1–1·5 cm. longus ; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae.

Flores minuti in racemos axillares spiciformes breve pedunculatos dispositi ; pedunculi 5–6 mm. longi, parce pubescentes ; rhachides glabri vel parce pubescentes, ad 10 cm. usque longi ; pedicelli glabri, masculi 2·5 mm. longi, glomerati vel nonnunquam basin racemi versus in spiculas minutas 6–10-floras subremotas aggregati, prope basin articulati ; feminei 2 mm. longi medio articulati ; bracteae minutae, ovato-lanceolatae, pubescentes, masculae pluriflorae, femineae 1-florae. *Calyx maris* viridis, 4-partitus, raro 5-partitus, in alabastro globosus minute apiculatus, extra versus apicem parce hirsutus ; lobi paulo ultra medium partiti ; tubus late campanulatus. *Stamina* 12 ; exteriora 6, cetera centralia ; filamenta loculos antherarum subglobosos excedentia ; glandulae receptaculares oblongae, apice hirsutae, filamentis aequilongae ; exteriores 12 per paria basi connatae sed paribus inter se liberis, ceterae juxtastaminales. *Calyx femineus* minutus ; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare ; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus e squamis 3 cum carpidiis alternantibus ovato-lanceolatis complanatis compositus. *Capsula* 3-cocca, vel 2-cocca didyma, raro monococca ; cocci 6 mm. lati, loculicide dehiscentes. *Semina* arillo rubro fere complete involuta, testa brunneo-nigrescens, minute foveolato - reticulata.—*E. aculeata*, De Wild. & Dur. Ann. Mus. Congo, Bot. sér. 2, i. 50 *et* sér 3, ii. 209 ; Dur. Syll. Fl. Cong. 491 pro parte : nec Benth.

Tropical Africa. Lower Guinea : French Congo ; Oubangi, Krebedji, Fort Sibut, *Chevalier*, 5617. South Central : Congo State ; Equatorial Province, Coquilhatville, *Dewevre*, 692.

Very nearly allied to *Poggeophyton aculeatum*, Pax. (*Engl. Bot. Jahrb.* xix. 89), which is also better referred to *Erythrococca*, but differing in the broader, denticulate, not crenate leaves. The hypogynous disk glands in the two also differ to some extent.

1259. **Erythrococca Laurentii**, *Prain* [Euphorbiaceae-Crotoneae] ; species *E. subspicatae*, Prain, quam maxime affinis sed foliis margine obscure crenulatis petiolisque brevioribus latioribus facile distinguenda.

Frutex ramulis glabris, cortice viridescente lenticellato ; gemmae perulatae squamis persistentibus. *Folia* breve petiolata, membranacea, ovata, acute acuminata, basi cuneata, margine obscure crenulata, 7–8 cm. longa, 3·5–4 cm. lata, saturate viridia, glabra ; nervi laterales utrinsecus 3–4 ; petiolus crassus, glaber, supra late canaliculatus, 0·5 cm. longus ; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae. *Flores* masculi ignoti ; feminei in racemos axillares spiciformes breve pedunculatos dispositi ; pedunculi 0·3–0·4 cm. longi et rhachides ad 8 cm. usque longae parcissime pubescentes ; pedicelli glabri, solitarii, 2 mm. longi, prope basin articulati. *Calyx* femineus minutus ; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare ; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus e squamis 3 cum carpidiis alternantibus ovato-lanceolatis complanatis compositus. *Capsula* ignota.—*E. aculeata*, De Wild. Miss. Laurent 129 ; Dur. Syll. Fl. Cong. 491 pro parte : nec Benth.

Tropical Africa. South Central : Congo State ; Aruwimi Dist., Lie, *Laurent*.

Very closely allied to *E. subspicata*, Prain, with which it agrees as regards its female flowers, but from which it is readily distinguished by its foliage.

1260. **Erythrococca Poggeophyton**, *Prain* [Euphorbiaceae-Crotoneae]; species e grege *E. subspicatum*, Prain, includente sed foliis margine crenatis nec denticulatis et disco hypogyno 2-seriato facillime distinguenda.

Frutex monoicus, ramulis primum pubescentibus demum fere glabris, cortice viridescente lenticellato; gemmae perulatae squamis deciduis. *Folia* breve petiolata, membranacea, oblongo-lanceolata, acuta, basi rotundata, margine crenata, 7·5–10 cm. longa, 2·5 cm. lata, pallide viridia, glabra, nervi laterales utrinsecus 3–4; petiolus pubescens, 0·6–0·8 cm. longus, supra canaliculatus; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae. *Flores* minuti in racemos axillares spiciformes breve pedunculatos dispositi; pedunculi 0·5 cm. longi et rhachides ad 10 cm. usque longae parce pubescentes; pedicelli glabri, 2·5 mm. longi, utriusque sexus solitarii, prope basin articulati; bracteae minutae, ovato-lanceolatae, pubescentes, imae 5–6 flores masculos ceterae femineos subtendentes. *Calyx maris* viridis, in alabastro globosus minute apiculatus, extra versus apicem pubescens, dein paulo ultra medium 4-partitus; lobi membranacei; tubus late campanulatus. *Stamina* 9; exteriora 5, cetera centralia; filamenta loculos antherarum subglobosos excedentia; glandulae receptaculares ovoideo-oblongae, apice hirsutae, filamentis aequilongae; exteriores 10 annulum extrastaminalem efficientes, ceterae juxtastaminales. *Calyx femineus* quam masculus paulo minor; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus 2-seriatus; interior e staminodiis 3 cum carpidiis alternantibus filamentis crassiusculis subcylindrico-clavatis apice antherarum locellos cassos suffulcientibus compositus; exterior e glandulis 5 apice hirsutis glandulis maris receptacularibus consimilibus sed latioribus annulum extrastamodialem efficientibus compositus. *Capsula* 3-cocca, vel 2-cocca didyma, vel casu abortuque monococca: cocci 6 mm. lati, loculicide dehiscentes. *Semina* arillo rubro vix complete involuta, testa brunnea minute foveolato-reticulata.—*Poggeophyton aculeatum*, Pax in Engl. Bot. Jahrb. xix. 89; Dur. & Schinz, Étud. Fl. Cong. 245; Engl. in Sitz. Preuss. Akad. Wiss. xxxviii. 829; Dur. Syll. Fl. Cong. 490, 656.

Tropical Africa. South Central: Congo State: Kasai Dist., on the Lulua, *Pogge*, 1370.

A very interesting species remarkable on account of the double hypogynous disk. The male flowers are borne on the lower part of the female rachises, but are solitary like female ones and not glomerulate as is the rule with the male flowers in this genus. The hypogynous scales, which in most other species of the genus alternate with the carpels and subtend the ovary, are in *E. Poggeophyton* replaced by well developed staminodes; these staminodes are surroumded by an extra-staminodial ring of glands exactly like the extrastaminal ring of receptacular glands met with in the male flowers of a considerable proportion of the species of *Erythrococca*. The fact that the female inflorescence is abnormal

in having a few basal male flowers, suggests that the female flowers may also be abnormal in having staminodes in place of hypogynous scales, and in being provided with an extrastaminodial ring of receptacular glands of the male type. Except that the leaves are crenate in place of denticulate, and that the stamens are 9 instead of 12, *E. Poggeophyton*, apart from its disk characters, differs but slightly from *E. subspicata.*

XX.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatorum.

DECAS LX.

591. **Polygala aureocauda,** *Dunn* [Polygalaceae]; affinis *P. arillatae*, Ham., sed ab illa ceterisque speciebus gerontogeis habitu arborescente racemisque longis pendulis terminalibus differt.

Arbor parva, ubique floribus exceptis primo puberula, glabrescens. *Folia* alterna, oblonga, acuminata, basi obtusa, 13–15 cm. longa, integra, papyracea, petiolis 5 mm. longis. *Racemi* terminales, fere sessiles, penduli, primo apice caudati, post anthesin ad 30 cm. elongati. *Flores* lutei, singuli, approximati, 1·6 cm. longi, ciliolis exceptis glabri, pedicellis erecto-patentibus 3 mm. longis. *Sepala* 3 exteriora colorata, ciliolata, inaequalia; posticum saccatum, 7 mm. longum; antica plana, minora; 2 interiora obovata, petalis aequilonga. *Petala* postica cum aliis connata, basi in sepali saccam producta. *Carina* apice cristam stipitatam fimbriatam 3 mm. longam gerens. *Capsula* erecta, late obcordata, compressa, 1·2 cm. diametro, concentrice lineata, valvis chartaceis. *Semina* 4 mm. diametro, glabra.

China. Hongkong, *C. Wright*, 22; *Champion*; hill above 300 yds. rifle range, *Urquhart*; ravine on Mount Parker, *Wilford*, 229.

Hemsley referred most of these specimens to *P. arillata* in his Enumeration (Journ. Linn. Soc. xxvi. 59), but noted that they might possibly represent a different species. That this is actually the case I have no doubt after seeing wild trees with their remarkably long drooping terminal racemes.

592. **Coxella,** *Cheesem. et Hemsl.* [Umbelliferae-Seselineae-Angeliceae] nomen genericum novum; planta insignis ab auctoribus ad genera diversa relata, scilicet: *Ligusticum*, *Gingidium*, *Angelicam* et *Aciphyllam*, ab omnibus tamen differt vittarum numero dispositio et magnitudine.

Coxella Dieffenbachii, *Cheesem. et Hemsl.* (species unica). *Herba* glabra, subcarnosa, circiter metralis, inflorescentia radicali dense ramosa. *Folia* omnia radicalia, longe petiolata, flaccida, subternatim 3-pinnata vel 4-pinnata; lamina oblonga vel ovato-oblonga; pinnae primariae 4- vel 5-jugae; segmenta ultima linearia, 4–8 cm. longa, 2–4 mm. lata, mucronata; petiolus quam lamina saepius (an semper ?) longior, crassus, vagina apice bidentata, dentibus parvis

obtusis. *Inflorescentiae* amplae axi primaria crassa sulcata, umbellis numerosis compositae; bracteae late vaginatae, lamina pinnatisecta; pedunculi 5–15 cm. longi. *Flores* unisexuales, monoïci vel dioici. *Florum masculorum* radii numerosi, graciles, femineorum ad 6. *Involucri bracteae* paucae, lineari-lanceolatae, flores vix excedentes. *Fructus* ad 1·5 cm. longus, 1 cm. latus, calycis dentibus ac stylis minutis; mericarpia saepissime difformia, alterum bialatum, alterum trialatum, alis circiter 5 mm. latis; vittae inconstantes, sed saepius 3 commissurales, 2 vel 3 costales, valleculis bivittatis, costales latissimae, vel interdum deficientes.—*Ligusticum Dieffenbachii*, Hook. f., Handb. Fl. New Zeal. p. 729. *Gingidium Dieffenbachii*, F. Muell., Veg. Chath. Is. p. 17. t. 1. *Aciphylla Dieffenbachii*, Kirk, Student's Fl. New Zeal. p. 211; Cheesm. Man. N.Z. Flora, p. 214. *Anglica Dieffenbachii*, Benth. ex Hook. f., Gen. Plant. vol. i. p. 916; Cheeseman, l. c. 1139.

Chatham Islands. *Travers*, *Cox* and others.

Mr. Cheeseman will describe this plant more fully in another place. For a figure of the habit of the plant and some other particulars see *Kew Bulletin* 1910, p. 124.

593. **Ophiorrhiza Lacei**, *Craib* [Rubiaceae-Hedyotidae]; species nova *O. Thomsoni*, Hook. f., similis a qua inflorescentia haud glabra facile distinguenda.

Herba 5–11 cm. alta, caule puberulo. *Folia* parum inaequalia, oblongo-elliptica vel ovato-lanceolata, apice acutiuscula, mucronata, rarissime acuminata, basi attenuata, 3·5–10·5 cm. longa, 1·6–4 cm. lata, membranacea, supra parce setulosa vel glabra, subtus ad nervos minute puberula, nervis lateralibus utrinque 10–13 intra marginem arcuatis utrinque conspicuis; petioli 0·5–2·5 cm. longi, minute puberuli; stipulae deciduae. *Cymae* terminales, pedunculo 2–5·5 cm. longo suffultae; bracteae persistentes, lineares vel oblongo-lineares, 0·5–0·8 cm. longae. *Receptaculum* campanulatum, parvum, puberulum. *Calycis* lobi minuti, deltoidei. *Corollae* purpureae tubus circiter 4 mm. longus, superne leviter expansus, extus parce puberulus; lobi 1·5 mm. longi, vix 1 mm. lati. *Capsula* late obcordata, minute puberula.

Indo-China. Upper Burma: Gokteik Gorge, 450 m., *Lace*, 4151.

594. **Adenosacme chasalioides**, *Craib* [Rubiaceae-Mussaendeae]; ab *A. longifoliae*, Wall., var. *sinensi*, Hemsl., sepalis integris recedit.

Suffrutex floribus exceptis omnino glaber; caules cortice stramineo nitido obtecti. *Folia* lanceolata, apice acuminata, acuta, basi in petiolum 0·5–2 cm. longum attenuata, 6–23 cm. longa, 1·8–5·5 cm. lata, tenuiter chartacea, supra viridia, subtus pallidiora, nervis lateralibus utrinque 10–18 intra marginem arcuatis pagina utraque cum nervis transversis conspicuis; stipulae subpersistentes, foliaceae, 6–7 mm. longae, 4 mm. latae. *Paniculae* terminales; bracteae parvae, deciduae; pedicelli circiter 3 mm. longi. *Receptaculum* glabrum, subhemisphericum; sepala insigniter viridia, lanceolata vel late lanceolata, acuta vel fere acuminata, 3–3·5 mm. longa, 1–1·5 mm. lata, glabra. *Corollae* tubus 1·6 cm. longus, extra glaber, intra parce pilosus, lobi sub anthesi reflexi, late deltoidei, subacuminati, 1·5 mm. longi, 2·5 mm. lati. *Stamina* inclusa, apicem versus

tubi inserta, filamentis brevibus, antheris oblongis 3 mm. longis. *Stylus* 3·5 mm. longus, breviter parce pubescens, ramis duobus 4·5 mm. longis glabris.

INDO-CHINA. Upper Burma: Gokteik Gorge, 450 m., *Lace*, 4860, [Herb. Kew et Herb. Lace].

595. **Saussurea Veitchiana**, *Drummond et Hutchinson* [Compositae-Cynaroideae]; e grege *S. bracteatae*, Decaisne, a *S. obvallata*, Wall., et aliis amplius bracteatis capitulis latius corymbosis demum longe pedunculatis;—a *S. uniflora*, Wall., pappo conspicue biseriato, ab *S. Schultzii*, Hook. fil., folorium margine argute denticulato, nec crasse crenato-serrato, dignoscitur;—a *S. iodostegia*, Hance in Journ. Bot. 1878, p. 109, cujus maxime affinis, propter folia superiora basi dilatata necnon phyllaria acutiora satis distincta.

Herba robusta, circiter 4·5–5 dm. alta, caulibus ad quinque e rhizomate foliis dense coronata, orientibus. *Caules* recti, rigidi, alte et crebre sulcati, superne villis laxis sparse instructi, in 2–10 pedunculos sub capitula incrassatos fistulosos ramificati, inferne demum glabrescentes. *Folia* radicalia anguste oblongo-lanceolata, sub anthesi persistentia, petiolis vix 4 cm. longis suffulta, caulina suberecta, omnino sessilia, infima longe vaginata, anguste oblongo-lanceolata, longitudine 20 cm., latitudine paullo infra medium fere 4 cm. attingentia, superiora ovato-lanceolata, obtuse auriculata, omnia semiamplexicaulia, nitide virescentia, costa pallidiore robustissima basin versus expansa, nervis secundariis abruptius ascendentibus in pagina superiore leviter immersis, inferiore elevatis eleganter anastomosantibus, supra fere glabrata, subtus laxe pilosa, marginibus plus minusve undulatis remote et argute denticulatis, apice acuta, versus summum caulem sensim diminuentia, denique in bracteas membranaceas maximas circiter 4–6 cm. longas 2–3 cm. latas plus minusve cymbiformes obscure carinatas apice angustissime acuminatas pulchre purpurascentes capitula juniora quasi involucrantes transformata. *Capitula* plus minusve araneosa, aestivationis tempore fere ovoidea, superne nonnihil constricta, circiter 2·5 cm. longa, parte ventricosa circiter 1·2 cm. lata, per summos flosculos diametro vix 2·5 cm. attingentia, flosculos 20–30 laxe divergentes atro-purpureos includentia. *Receptaculum* (in capitulis junioribus) circiter 5 mm. latum, fimbrillis capillaribus subpellucidis ornatum. *Phyllaria* appresse imbricata, fere uniformia, exteriora ovato-lanceolata, circiter 1 cm. longa, 4 mm. lata, laxe pilosa, acuta, nigrescentia, intus pallide virescentia, nitida, glabrata, interiora magis acuminata, longiora. *Flosculorum* tubus in parte inferiore multo longiore tenuissimus, plus minusve angulatus, glaber, subito late campanulatus, 8 mm. longus; limbus in quinque segmenta linearia basi obscure saccata divisus. *Antherae* basi caudato-lanatae, demum atratae. *Stylus* sub stigmata minute pubescens. *Achaenia* obtuse quadrangula, subglabra, pappo biseriato exteriore e setis scabrioribus paucis purpurascentibus deciduis interiore satis copiosis duplo longioribus plumosis demum fuscescentibus consistente munita.

CENTRAL CHINA. Fang, *E. H. Wilson*, 2407.

The species has been described from living material and a habit-photograph communicated from Glasnevin, also from specimens received from Messrs. J. Veitch and Sons.

This is a remarkable species belonging to the "bracteate" group, most nearly allied to *S. iodostegia*, Hance in Journ. Bot. 1878, p. 109, discovered by Hancock in 1876, but readily distinguished by the much broader rounded bases of the stem leaves and the acute tips of the phyllaries which in *S. iodostegia* are obtuse and almost strap-shaped upwards; the solitary type of Hance's plant is very imperfect, but Mr. Spencer Moore has kindly referred us to a better specimen collected recently by Father Hughes in the same region.

596. **Gymnema Lacei**, *Craib* [Asclepiadaceae-Marsdenieae]; a *G. tingente*, Wight et Arn., foliis oblongo-lanceolatis facile distinguendum.

Caules graciles, teretes, praeter nodos parcissime puberulos bifacialiter puberuli. *Folia* oblongo-lanceolata, apice plus minusve distincte acuminata, basi rotundata, nisi juniora obtusa, 5–7·3 cm. longa, 1·3–2·3 cm. lata, membranacea vel rigide membranacea, margine integro recurvo, pagina superiore costa nervisque puberulis exceptis glabra, inferiore indumento ut in superiore sed paulo densiore, nervis lateralibus utrinque circiter 4 obliquis intra marginem arcuatis pagina utraque sicco subprominulis; petioli circiter 4 mm. longi, supra canaliculati, puberuli. *Pedicelli* 0·5 cm. longi, puberuli. *Sepala* late lanceolata, acuta, 3 mm. longa, 1·5 mm. lata, ciliolata. *Corallae* tubus sepala vix aequans; lobi oblongi, obtusi, 4 mm. longi, 2 mm. lati. *Corona* e lineis duabus carnosis pubescentibus corollae lobis alternantibus et fere ad corollae tubi basem continuatis constituta. *Antherae* in appendicem membranaceam productae; pollinia oblonga, erecta.

INDO-CHINA. Upper Burma: Katha; Kadu, *Lace*, 4297.

forma **minor**, *Craib*, a typo partibus omnibus minoribus differt.

INDO-CHINA. Upper Burma: Kyaukse Hill, *Lace*, 4871.

Lace, 4871 is apparently only a starved form of No. 4297—there appears to be no difference except in the size of the various parts and a very slight difference in the shape of the anther appendage.

597. **Swertia Lacei**, *Craib* [Gentianaceae-Swertieae]; a *S. striata*, Coll. et Hemsl., foliis angustioribus, corollae nervis subobscuris, nectariis multo minoribus distincta.

Herba erecta, parce ramosa, circiter 4 dm. alta, glabra. *Folia* sessilia, linearia, apice mucronulata, 1–3·8 cm. longa, rigidiuscula, margine recurvo, nervis lateralibus omnino obscuris. *Cymae* pluriflorae, ramulis axillaribus plerumque arcuatis ad 3 cm. longis gestae; pedicelli ad 8 mm. longi. *Sepala* 4, lineari-lanceolata, acuta, 4–5·5 mm. longa, 1–1·5 mm. lata. *Corollae* tubus brevis; lobi elliptici vel obovata-elliptici, obtusi, 7 mm. longi, 5 mm. lati, intus nectaris semiorbiculari breviter fimbriato ornati, nervis subobscuris. *Filamenta* 3 mm. longa, inferne gradatim dilatata; antherae 1 mm. longae. *Pistillum* 4 mm. altum, superne in stylum brevem attenuatum, glabrum.

INDO-CHINA. Upper Burma: Maymyo Plateau, 1050 m., *Lace*, 4373.

598. **Fimbristylis (Abilgaardia, *Vahl.*) straminea,** *Turrill* [Cyperaceae-Scirpeae]; species *F. fuscae*, Benth., affinis, statura minore, spiculis paucioribus, glumis stramineis glabris angustioribus numerosioribus, stylo breviore et nuce minore differt.

Planta perennis, erecta. *Culmi* 6–12 cm. alti, 3–5-spiculigeri. *Folia* brevia, recurvata, 1 mm. lata, quartam partem culmi aequantia, subacuta, serrata. *Umbella* saepissime simplex; radii usque ad 2 cm. longi. *Bracteae* 3, longissima 7–8 mm. longa, brevissima 4 mm. longa, 0·4 mm. latae. *Spiculae* lineari-lanceolatae, 7 mm. longae, 1·5 mm. latae, glumis nucigeris 10. *Glumae* acuminatae, glabrae carina ciliata excepta, straminaeae, 3 mm. longae, 0·5 mm. latae, inferiores subdistichae, 3 imae vacuae. *Stamina* 2. *Stylus* 2 mm. longus, glaber, 3-fidus cum basi dilatata deciduus. *Nux* obovoidea, trigona, 0·75 mm. longa, verrucosa, alba.

Siam. Chiengmai; Doi Sootep, 550–600 m., *Kerr*, 832.

599. **Oxytenanthera Lacei,** *Gamble* [Gramineae-Bambuseae]; affinis *O. Thwaitesii*, Munro, sed vix scandens, spiculis 2-floris, cataphyllis brevioribus haud aeque conspicue auriculatis et foliis tenuioribus differt.

Frutex erectus. *Culmi* virides vel viridi-glaucescentes, fistulosi, laxe ad basin fasciculati, ramis foliiferis duris ultimis non fistulosis, ramis floriferis fistulosis vel solidis teretibus. *Cataphylla* culmorum 20–30 cm. longa, ad basin 15–20 cm. lata, ad apicem 4–6 cm. lata, straminea, conspicue striata, dorso in parte superiore dense spinulis nigrescentibus tecta; lamina subulato-lanceolata, reflexa, 10–30 cm. longa, basi paullo contracta et utrinque auriculis brevibus plicatis fimbriatis instructa; ligula circa 5 mm. longa, ore longe fimbriata. *Folia* tenuia, pallida, in ramis gracilibus geniculatis fasciculatis; vaginae stramineae, striatae, dorso spiculis albis munitae, ore auriculis longis sparse sed longe fimbriatis cito deciduis instructae; laminae 10–20 cm. longae, 1–2 cm. latae, supra scaberrimae, infra pubescentes, marginibus etiam scabrae, apice acuminatissimae, basi subcordatae, nervis utrinque 5 infra conspicuis; ligulae breves, membranaceae, dentatae. *Flores* in glomerulis ad nodos ramorum 20–40 cm. longorum fasciculatorum; glomeruli circa 2 cm. diametro, ad 10–12 spiculas fertiles cum multis infertilibus minoribus et bracteis paleaceis mixtas ferentes; spiculae 5–7 mm. longae, glaberrimae, basi bracteis 1–3 parvis suffultae; glumae vacuae 2–3, ovatae, mucronatae, inferior 3 mm., superior 4–5 mm. longa; flores fertiles 2; glumae florentes (valvae) ovatae, longe mucronatae, floris inferioris 6 mm. longae, superioris 8 mm. longae; palea floris inferioris bicarinata, carinis ciliata, apice emarginata, 5-nervis, floris superioris convoluta, glabra, apiculata. *Stamina* 6, purpurea; juniora subsessilia, libera, vetustiora filamentis in tubum longissimum exsertum coalita, tandem soluta; antherae lineares, apice mucronatae. *Ovarium* ovato-lanceolatum, in stylum gracilem pubescentem alternatum. *Caryopsis* ignota.

Burma. Thaton District: E. of Salween river, Hlaingbwe Forest Reserve and Melaung, *Lace*, 4578, 4584. (Feb. 1909).

600. **Selaginella strigosa,** *Beddome* [Selaginellaceae]; ex affinitate *S. plumosae*, Baker, a qua foliis strigosis differt.

Caulis prostratus, 15–20 cm. longus, angularis, pinnatim ramosus ; rami ad 1 cm. longi. *Folia* lateralia caulina inter se 0·5 mm. distantia, ramealia approximata, oblique ovata, cuspidata, 2 mm. longa, 0·75 mm. lata, basi latere superiore cordata imbricataque, ciliata, utrinque plus minusve strigosa ; folia intermedia 1·5 mm. longa, late ovata, longe cuspidata, dense ciliata. *Spicae* 8 mm. longae, tetragonae ; bracteae e basi ovata cuspidato-acuminatae, fortiter carinatae, ciliatae.

Malay Peninsula. Selangor : Klang Gates, *Ridley*, 13,442 and 13,446 ; Ginting Bida, *Ridley*, 7815 and 7825.

XXI.—ADINOBOTRYS AND PADBRUGGEA.

S. T. Dunn.

A large proportion of the dense tropical forest which clothes the sea shores of Martaban and Tennasserim consists, according to Wallich (Pl. As. Rar. i. (1830), 70 t. 78), of the fine leguminous tree which the Burmese call *Chukkha*. When in flower the crown is covered with dense panicles of dark purple flowers, and Wallich, who considered it a relation of *Pongamia glabra*, therefore named it *Pongamia atropurpurea*. While it can hardly be associated with *Pongamia*, which is characterised by axillary racemes, it is not clear upon what grounds Bentham in his notes upon *Millettia* in *Plantae Junghunianae* (1851–5), 249, transferred it to that genus, for its oval, one-seeded, indehiscent fruit and the few-ovuled, stipitate ovary, well shown in the figure above cited, indicate widely different characters from all the other Millettias then known.

Closely allied to this tree in floral structure and in fruiting characters, though quite different in habit, are four woody lianes from the same part of the world, viz., the slender woody climber described by Bentham as *Millettia eriantha*, the Bornean species *M. Nieuwenhuisii* and two others described for the first time in this paper. These share the following combination of characters which distinguish them from all true Millettias : inflorescence densely crowded, wings and keel semi-sagittate, ovary stipitate, ovules 2 (or 3), pod one-seeded, indehiscent, and it is therefore proposed to make the five species the types of a new genus under the name of *Adinobotrys* (αδινος crowded, βοτρυς bunch).

Equally distinct from *Millettia*, though referred to it in all recent floras, are two more lianes which inhabit the dense jungles of Selangor and Perak, and possess, like *Adinobotrys*, stipitate few-ovuled ovaries and one-seeded pods. They differ however from the latter genus in their loose inflorescences, wings and keel cuneate or rounded below and in their pods which sometimes open naturally at maturity. These are *M. Maingayi*, Baker, and *M. oocarpa*, Prain.

When Baker ascribed the above species to *Millettia* he was following the precedent set by Bentham of including plants with stalked ovaries and one-seeded indehiscent pods—the pods of his species are not known to dehisce—in that genus. He was doubtless unaware that, many years previously, Miquel (Fl. Ned. Ind. i. (1855), 150), had described a very similar plant from the forests of Java. Even without fruit Miquel detected the distinction of this

liane from *Millettia* and made it the type of a new genus which he called *Padbruggea* after Robert Padbrugge, patron of Rumphius and Governor of the island of Amboina. A few years later the discovery of the fruit of *P. dasyphylla*, as he called his species, by Teysmann in Sumatra gave further support to his decision. *Padbruggea dasyphylla* is actually the same as *Millettia oocarpa*, and with *M. Maingayi* may conveniently be restored to its generic status under Miquel's designation and be placed beside *Adinobotrys*.

By the definition of *Adinobotrys* and the revival of *Padbruggea* the heterogeneous collection of groups which has gradually accumulated around Wight and Arnott's genus *Millettia* will lose some of its most aberrant members. These two genera, in spite of the above-mentioned characters which distinguish them from *Millettia*, are nevertheless more nearly related to that genus than to *Pterocarpus*, *Derris*, *Pongamia* and the other genera with indehiscent pods which Bentham placed together in the tribe *Dalbergieae*. Thus *Adinobotrys erianthus* (*Millettia eriantha*), agrees in its petal and disc characters with *M. cinerea*, which is otherwise a true *Millettia*, while it approaches *Wistaria*, an unquestionably galegioid genus in all its floral characters excepting that its ovules are few.

Thanks to the courtesy of the Director of the Royal Botanic Gardens, Kew, the writer has been able to carry out the whole of the work entailed in this paper in the Herbarium of that establishment, and all the specimens referred to will be found there.

Adinobotrys.

Adinobotrys, *Dunn*, gen. nov. [Leguminosae-Galegeae]; affinis *Millettiae*, Wight et Arn., sed ovario stipitato, legumine monospermo indehiscente differt.

Calyx breviter 5-dentatus, dentibus duobus anticis partim connatis. *Vexilli* lamina rotundata, ungue brevi. *Alae* oblongae, semisagittatae. *Carina* alis similis. *Stamina* vexillari soluto diadelphia. *Ovarium* stipitatum, 2- (1- vel 3-) ovulatum. *Stylus* incurvus, stigmate parvo terminali. *Legumen* oviforme, paullo compressum, indehiscens. *Semen* unicum, magnum.

Frutices scandentes vel raro arbores. *Folia* alterna, imparipinnata, foliolis oppositis. *Flores* in paniculis racemisve saepius lateralibus dense conferti. *Bracteae* saepe conspicuae, ad anthesin persistentes; bracteolae latae.

Species 4 Indo-malayanae et 1 Chinensis.

Clavis specierum.

Inflorescentiae laterales—
  Racemi breves—
    Racemi floresque sessiles ... ... 1. *A. erianthus.*
    Flores longe pedicellati ... ... 2. *A. filipes.*
  Paniculae magnae—
    Vexillum cordatum ... ... 3. *A. Nieuwenhuisii.*
    Vexillum basi acuminatum ... ... 4. *A. myrianthus.*
Inflorescentiae terminales ... ... 5. *A. atropurpureus.*

1. **A. erianthus**, *Dunn*, nom. nov. *Millettia eriantha*, Benth. in Plant. Jungh. (1851–55), 250; Miq. Fl. Ned. Ind. i. (1855), 155; Baker in Hook. f. Fl. Brit. Ind. ii. (1876), 108; Prain in King in Journ. As. Soc. Beng. lxvi. 2 (1897), 89.

Malay Peninsula. *Griffith*, 1761, 1836 ; Malacca, *Griffith*, 1845, *Maingay*, 519 ; Perak, fide *Prain* (l.c.) ; Pahang, *Ridley*, 2644.

2. **A. filipes**, *Dunn*, sp. n. ; affinis *A. eriantho*, Dunn, sed floribus graciliter pedicellatis differt.

Frutex parte juveni dense rufo-hirsuta, alte scandens. *Folia* pinnata, matura non visa ; foliola vix adulta oblonga, obtuse

acuminata, basi rotundata, 5 cm. longa, membranacea, glabrescentia, 6–7-paribus, petiolulis 3 mm. longis, stipellis nullis. *Racemi* laterales, praecoces, tandem 12 cm. longi, rachide ut pedicellis calycibusque breviter velutina. *Flores* singuli, approximati, 2·4–2·6 cm. longi ; bracteae ante anthesin flores omnino obtegentes, ovatae, acuminatae, ad 2 cm. longae, membranaceae, tenuiter sericeae ; pedicelli 2 cm. longi. *Calyx* 6 mm. longus, 5 mm. latus, dentibus 3 posterioribus tubo aequilongis, vexillari breviore bidentato. *Petala* violacea vel rosea. *Vexillum* orbiculatum, breviter unguiculatum, basi laminae biappendiculatum. *Alae* et *carina* antice paullo falcatae. *Stamen* vexillari solutum. *Discus* brevis, cylindricus, basem ovarii cingens. *Ovarium* longe stipitatum, biovulatum, sericeum.

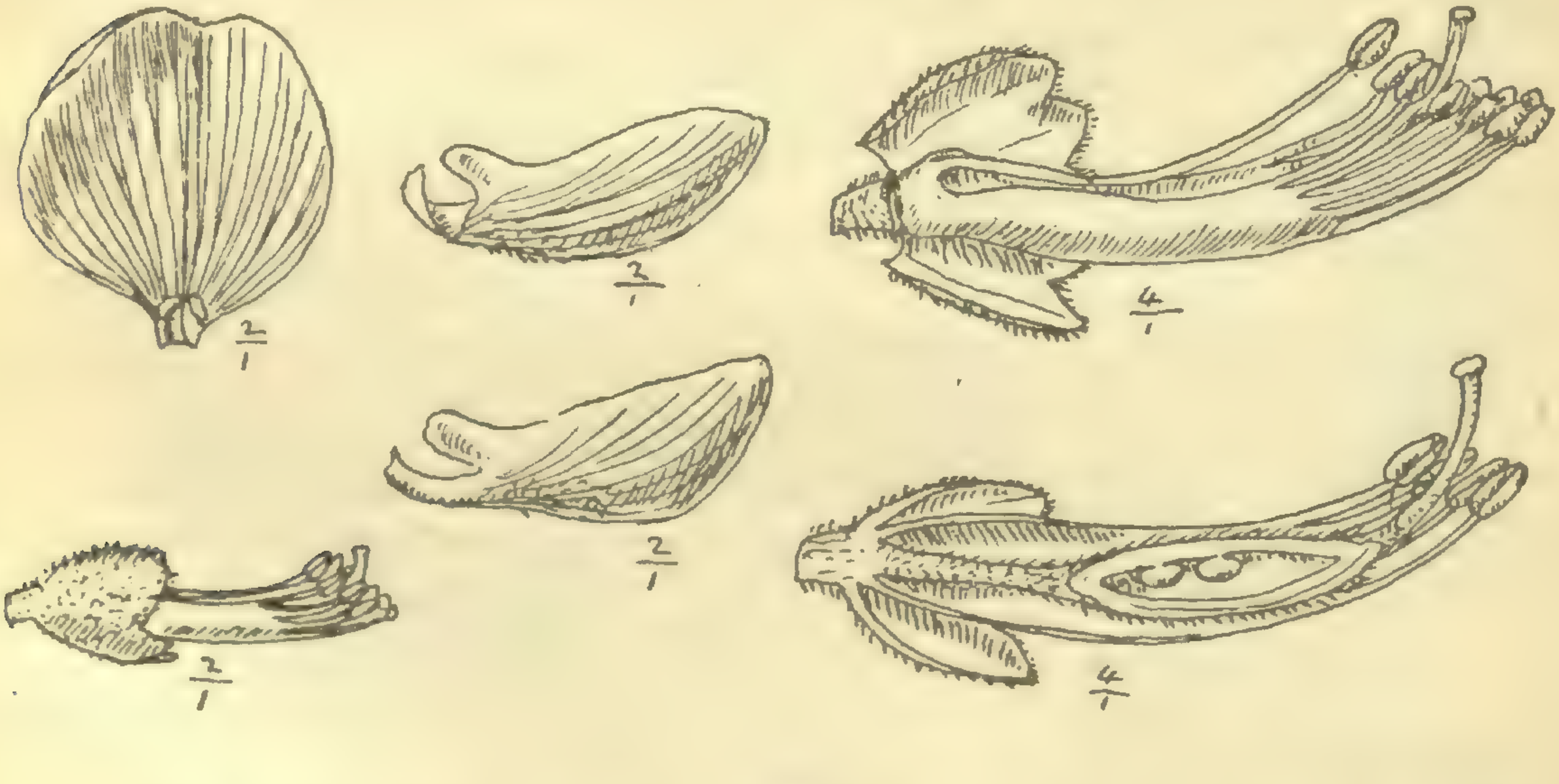
China. Yunnan : Szemao, East Mountains, forests 1520 m., *Henry* 11,610. Kwangsi : Lungchow, *Morse*, 642.

In the markedly perigynous insertion of the corolla and stamens and the persistence of the large bracts up to the time of flowering, this species approaches *A. erianthus* more nearly than any other member of the genus. It differs from all and approaches *Padbruggea* in its auriculate standard.

3. **A. Nieuwenhuisii**, *Dunn*, nom. nov. ; *Millettia Nieuwenhuisii*, J. J. Smith in Bull. Dép. Agric. Ind. Néerl. iii. (1906), 17 : Ic. Bogor. t. 230–1 (1907).

Borneo (fide *J. J. Smith*). Cult. in Hort. Bogor., 86.

4. **A. myrianthus**, *Dunn*, sp. nov. ; affinis *A. Nieuwenhuisii*, Dunn, sed bracteis bracteolisque minoribus vexillo non cordato, foliolis paucioribus differt.



Frutex scandens. *Folia* 1–2-juga, 30–40 cm. longa ; foliola ovato-oblonga, acuminata, caudata, basi rotundata vel subcordata, 10–20 cm. longa, chartacea, glabra, utrinque reticulata, venis 5–6-paribus, petiolulis 8 mm. longis, stipellis nullis. *Panicula* lateralis, 20–30 cm. longa, ramis numerosis, longis, flagelliformibus.

Flores secus ramos dense subspicati, bracteis caducis. *Calyx* campanulatus, 2-3 mm. longus, lobis 4, parvis, vexillari bidentato, sicut rachis, vexillum et carina breviter sericeo-tomentosus, bracteolis supra basin tubi affixis, sed ejus apicem non attingentibus. *Vexillum* basi rotundatum vel acuminatum, exauriculatum, 8–9 mm. longum. *Alae* oblongae, basi antice semi-sagittae. *Carina* similis. *Stamen* vexillare ab aliis liberum saepe vexilli ungui plicata amplexum. *Ovarium* utrinque angustatum, medio biovulatum, sericeum. *Legumen* ignotum.

Borneo. Sarawak, *Beccari*, 656, 887, 875; *Hose*, 248 (Marudi), 436 (Entoyut River); *Haviland* and *Hose*, 3376 (Kuching); Niah, *Haviland* and *Hose*, 3279.

Besides the differential characters mentioned above, this species may be distinguished from *A. Nieuwenhuisii* by the position of the curious bracteoles, which are attached below the middle of the calyx and thus do not reach the sinuses of the lateral teeth, instead of surpassing them as in that species.

5. **A. atropurpureus**, Dunn, nom. nov. *Pongamia atropurpurea*, Wall., Cat. n. 5910, Pl. As. Rar. i. (1830), 70, t. 78. *Millettia atropurpurea*, Benth. in Pl. Jungh. (1851–5), 249; Miq. Fl. Ind. Bot. i. (1855), 157; Baker in Hook. f. Fl. Brit. Ind. ii. (1876), 108; Prain in Journ. As. Soc. Beng. lxvi. 2 (1897), 89.

Indo-Malaya. Tenasserim to Sumatra.

Burmah. Tenasserim, Wallich 5910, *Falconer*, 551, *Griffith*, 1763 (Moulmein) and Merqui, *Beddome*, 25.

Malay Peninsula. Penang Hill, *McNair*; Malacca, *Griffith*, *Maingay*, 517; Jalor, *Gwynne-Vaughan*, 512; Perak, *Wray*, 2526, *King's Collector*, 8012; Pahang, *Ridley*, 2610. Sumatra. *Teysmann*. Borneo. *Haviland*, 1776.

Padbruggea.

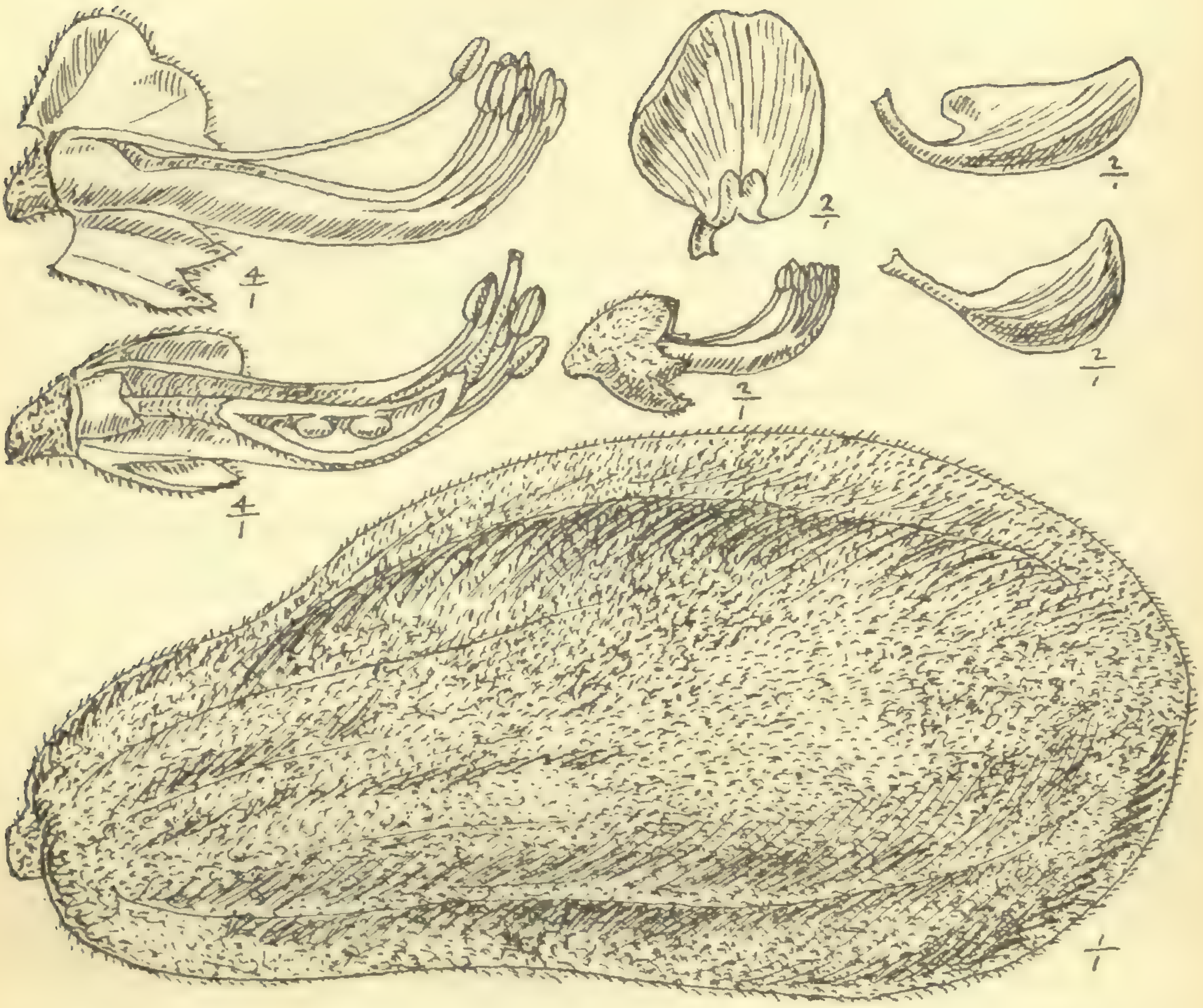
Padbruggea, Miq. Fl. Ind. Bot. i. (1855), 150; Suppl. (1860), 298.

The genus, which has been generally overlooked, is distinguished from *Millettia* by its stipitate, 2-ovuled ovaries, from *Wistaria* by the small number of ovules in the ovary and by its one-seeded subindehiscent fruit, and from *Adinobotrys* by its lax inflorescence and by the unappendaged wings and keel of its flowers.

Clavis specierum.

Leaflets revolute, densely tomentose below	...	*P. dasyphylla.*
Leaflets flat, nearly glabrous when mature	...	*P. Maingayi.*

P. dasyphylla, Miq. l. c. *Millettia oocarpa*, Prain in Journ. As. Soc. Beng. lxvi. 2 (1897), 365; Perak, *Scortechini*, 429; *Wray*, 2141.



MALAY PENINSULA.
JAVA. *Horsfield*, 19.

P. Maingayi, *Dunn*, nom. nov. ; *Millettia Maingayi*, Baker, in Hook. f. Fl. Brit. Ind. ii. (1876), 110 ; Prain l. c. 364.

MALAY PENINSULA. Perak, *King's Collector*, 8759 ; Selangor (fide *Prain*) ; Singapore, *Maingay*, 605 ; *Hallett*, 145 ; *Ridley*.

XXII.—BALATA.

Mimusops bidentata, DC.

(*M. Balata*, var. *Schomburgkii*, Pierre : *Sapota Mulleri*, Bl.)

J. M. HILLIER.

This is one of the more important products of the natural order *Sapotaceæ*, which includes the Gutta trees of Malaya and also many oil-bearing seeds of considerable economic value. On the authority of Dr. J. Huber,* the above is the only species definitely known to afford the Balata of commerce, though it is possible and indeed probable that other nearly allied species, natives of Dutch Guiana and the Lower Orinoco may also yield this product.

Balata is the inspissated juice of the Bullet or Bully tree, a large forest tree of Tropical America growing to a height of one hundred and twenty feet with, usually, a large spreading head, and a trunk

* Arvores de borracha e de Balata da região amazonica, pelo Dr. J. Huber, Boletim du Museu Goeldi, Dec. 1904, vol. iv., p. 415.

sixty to seventy feet long and four to five feet in diameter. The trunk is nearly cylindric, and as it does not buttress much at the base, is of almost uniform size from a few feet above the ground up to the first branches. The leaves are clustered towards the ends of the branchlets. They are four to eight inches long, by two to three inches wide, ovate-oblong in shape, and rounded or apiculate at the end, very leathery in texture, dark green above, but from the presence of a very fine lepidote coating are of a bright rusty tint beneath while young. The flowers spring from among the leaves and are very small but profusely produced. The fruit is about the size of a marble, resembling in taste and character the fruit of the allied Sapodilla or Naseberry tree (*Achras Sapota*), a much esteemed fruit of Tropical America and of the West Indies. This latter species is also the source of Gum Chicle largely used in the United States of America as a masticatory.

Balata is collected for commercial purposes in the Guianas and Venezuela, from whence it is exported to the United States of America and to Europe. There is little doubt that the possibility of converting the milky juice of this tree to industrial purposes was first discovered by the Dutch in the Colony of Surinam. In the Journal of the Society of Arts, October 9th, 1857, p. 625, Professor S. Bleekrode, after reviewing the state of the gutta percha market in Amsterdam, gives a full and interesting account of the Balata tree and also the results of chemical investigations made by him on samples of the latex. From this paper it appears that the tree is commonly called Bolletrie (paardenvleesch, Dutch) but this popular name gives no information as to its true origin, for it is given to various plants of different botanical affinity. In the description of Guiana, published in 1770, by the Dutch Governor, T. T. Hartsinck, no mention is made of the milky juice of the Bolletrie (Boerewy, Dutch), called Boerowé by the Arawack Indians. Mr. Hartsinck, however, gives a full description of the tree, which has been confirmed by recent travellers; he describes it as having a thick rough bark, containing a gum-like juice, or a bitter oil; the fruit resembles the plum, and is sweet, with a white, hard kernel; the leaves are like those of the laurel, glossy, oval and acuminated.

In continuation, Professor Bleekrode refers to a letter written to him by Mr. J. A. Muller from Paramaribo respecting the latex forwarded for examination and described by the writer as having been obtained from the Bullet tree, and also quotes from the *Revue Coloniale* (de Juillet Août, 1855), where it is stated, that in French Guiana will be found a tree (of the genus *Ficus*) containing a substance intermediate between caoutchouc and gutta percha. "Hence it was of the highest interest to decide upon the botanical species of this plant, which gives the milky juice of gutta percha. . . . .

"As an accurate description of a plant requires the examination of the flowers, foliage, and fruit, I took care to have specimens sent to me at the first opportunity. I received, in April last, the leaves and fruit; the flowers I am still expecting. I had thus sufficient means to determine the species of the Bullet tree, besides having the assistance of my friend and colleague, the well known botanical Professor, Dr. Blume. It was decided to be a new species

of *Sapota*, which has received, in honour of the first observer, Mr. Muller, at Paramaribo, the name *Sapota Mulleri*, Bl. A full description, with a drawing of the new plant, is given in the Dutch Journel De Volksvlijt, uitgegeven door de vereeniging boor Volksvlijt, te Amsterdam, 1857, Nos. 6 and 7, p. 279.

"An illustration is given of the fruit of the *Lucuma mammosa* [to which also the name Bolletrie is applied] to show the difference between the fruit of our gutta percha Bullet tree and that of the Lucuma. Several other botanical characters have led to the conclusion that our Bullet tree is not a species of Mimusops, this genus being indigenous to tropical Asia, as the Sapota is to the New World. The Bullet tree, or gutta percha Sapota, is very common in groups on the hilly country in Surinam, above the alluvial plains. To collect the milky juice an incision is made in the trunk, seven feet above the ground, and this is enclosed by a ring of clay, which serves at the same time as a reservoir. The juice flows out of the stratum between the liber and the alburnum in profusion; there is no necessity to cut the tree down, as was universally done at the commencement of the collection of gutta percha in the Indian Archipelago. . . . . .

A specimen of the gutta percha of Surinam, shown at the exchange at Amsterdam, was declared to be of first-rate quality.

Another specimen was tried in the gutta percha manufactory at Amsterdam. The result was, that it was declared to be of first-rate quality and that its strength was proved. It appears, however, that the gutta percha requires some time before it is thoroughly solid and hardened."

In the description of a specimen of the wood of the Buruch, Bully, or Bullet tree forwarded with other products from British Guiana to the Paris Universal Exhibition in 1855, it is stated in the catalogue that the leaves, branches, and trunk produce a whitish milk. Samples both of the milk and inspissated juice were sent from British Guiana to the London International Exhibition of 1862, also to the Paris Universal Exhibition of 1867. In the preface to the catalogue of the latter contribution from British Guiana, p. lxvii., Mr. D. Melville, of Berbice, makes the following remarks on the subject:—"The first attempt to introduce this material to the notice of British capitalists as an article possessing some probable commercial value was made by the writer early in the year 1860, when a small quantity of the gum sufficient for experimental purposes was sent to the house of Messrs. Silver & Co., of London. This was sent in consequence of a promise made to Mr. Silver in 1859, when visiting their factory at Silvertown, to search the forests of Guiana on my return for a substitute for india-rubber, Mr. S. having expressed his apprehensions of the supply of that material failing them. The report on the article was then hardly satisfactory; but at the Exhibition of 1862, Sir William Holmes actively interested himself in bringing the specimens with which he was provided into further and more prominent notice. Towards the end of that year an application was made by the Messrs. Silver urging that a few pounds of the dried material should be forwarded by return mail, if possible, to

enable them to make certain experiments that might lead to satisfactory results. It so happened, that this communication was received just a day or two previous to the dispatching of a boat and crew which had been prepared for the Canje Creek for the purpose of collecting a quantity of the gum meant to be submitted to the Gutta Percha Company of London. No delay was therefore experienced in the matter. The quantity of balata asked for by the Messrs. Silver was promptly forwarded, and this, followed by larger shipments, formed the initiatory of a new trade in the Canje Creek."

In many of its properties balata is stated to occupy an intermediate position between india-rubber and gutta percha, possessing the elasticity of the one and ductility of the other, without the intractability of the former or the brittleness of the latter, thus becoming under certain circumstances more valuable than either for industrial purposes. It is found in commerce both in block form and in sheets and is chiefly used as a substitute for gutta percha, and amongst other applications is employed in the manufacture of belting for machinery, hose, solid tyres, moulded goods, tubing, fruit jar rings, boot soles, &c.

In Colonial Report No. 671, British Guiana, for 1909–1910, it is stated that the output of balata for the year was 1,048,266 lbs., which shows a decrease of some 50,000 lbs. on that of the previous year, but this is accounted for by the fact that negotiations were proceeding between an English Company, "The Consolidated Rubber and Balata Estates Limited," and some of the larger balata licencees in the Colony for the transfers of their holdings. These negotiations were not brought to a close until the end of the year, and little work was done on the tracts meanwhile.

In Diplomatic and Consular Report No. 4580, Annual Series, on the trade, commerce and agriculture of Surinam for the year 1909, we find that the export of balata for the period was 628 tons of the value of £117,834, against 454 tons of the value of £83,269 shipped during 1908. The industry in this country shows a considerable improvement but there is, however, a great danger of its being ruined, owing to the want of supervision in the forests. The bleeders are paid according to the weight of the dried balata obtained, and it is stated that instead of bleeding the tree in the manner laid down by the Government, they extract as much as possible from each tree ; this practice, if allowed to continue, must eventually bring the industry to an end. It is desirable that a sufficient number of trustworthy inspectors or wardens should be appointed to protect the trees by seeing that the existing laws are observed, and so to preserve one of the most valuable assets of the Colony. With regard to labour it appears that many more men are being employed this year ; recently 100 men were imported from St. Lucia for the work ; these had, of course, no previous experience.

Quoting from Diplomatic and Consular Report No. 4411, Annual Series, on the trade and commerce of Ciudad Bolivar, Venezuela, for the year 1909 it appears that balata (block) was exported to the extent of 1624 metric tons. The high price prevailing for this article has stimulated its production. The system of felling the

trees to collect the gum still continues, and the productive forests are becoming more and more distant from the base of operations. The extent of country bearing the balata trees appears, however, to be so great that as soon as one district is exhausted another is discovered. Considering the total absence of modern transport facilities and that the product has to be carried from the forests over bad roads and tracks on donkey back or in ox wagons for distances exceeding 200 and 300 miles, it is surprising that the production should be so well maintained.

The Board of Trade Journal, April 27th, 1911, states, upon the authority of H.M. Consul at Ciudad Bolivar, that block balata was shipped in 1910 to the extent of 1880 metric tons, of the declared value of £451,275. This is the largest quantity and the highest value reached in any one year up to the present. The production in 1909, itself a record one, was 1624 tons. The principal supply now comes from very distant parts beyond the Caroni and Paragua rivers, and from both sides of the Cuyuni, near the frontier of British Guiana. It is estimated that these forests contain a further four years' supply. After that period it is difficult at present to see where any considerable quantity can come from, and even now these distant parts can only be worked while prices of balata gum remain high. Should they at any time fall below 1*s*. 9*d*. to 2*s*. per lb. it appears that it would be impossible to continue the working at a profit. It is said that even now a large proportion of the block balata shipped from Ciudad Bolivar is not the pure article, but is mixed with gums from other trees like the Pendare, Purguillo. Mata Palo, &c. It appears that these latter gums alone would scarcely find a good market, and they are therefore in many cases worked in with balata, in the proportion of one in three.

Those who are interested, commercially or otherwise, in this subject will find in "Rubber and Balata in British Guiana," by J. B. Harrison and F. A. Stockdale, full and trustworthy information on the present condition of the industry in that Colony.

This work has recently been issued by the Department of Science and Agriculture of British Guiana, and contains two maps and twenty-four illustrations. Price sixpence.

At present the market for this product is firm with a limited supply, the "block" form realizing 3*s*. and the "sheet" 3*s*. 11*d*. per lb.

Previous notes on this subject have appeared in the Annual Reports of the Royal Botanic Gardens, 1873, p. 6, 1877, p. 31, 1878, p. 39, 1881, p. 46.

XXIII.—MISCELLANEOUS NOTES.

W. E. Gumbleton.—The death of this gentleman, which occurred on April 4 at his residence at Belgrove, Queenstown, Co. Cork, has removed one who took a keen interest in Kew, and more particularly in that channel in which the energies of the establishment flow which is represented by the preparation of the Botanical Magazine. This interest he showed equally in a readiness to offer criticism and, what was of more consequence, in a constant desire

to assist. Gifted with an artistic temperament and at the same time possessed of a wide knowledge and endowed with a strong character, his personality was an extremely interesting one. A constitutional readiness to cavil at the opinions expressed by others and a peculiar sensitiveness to contradiction so far as his own views were concerned, prevented his being universally popular. But by those who could realise and appreciate his enthusiasm, who could find their way to the kernel within the husk—and the number of these was by no means limited—the death of Mr. Gumbleton will be felt as having created one of those blanks which cannot readily be filled. A man of means, leisure and taste, Mr. Gumbleton devoted himself to gardening and accumulated at Belgrove one of the richest libraries of works bearing on this subject in Ireland, and brought together there an extremely interesting collection of plants. These he dealt with in a characteristic and methodical fashion, concentrating his interest for the time being on some special genus or group of genera, acquiring as many forms as possible of the genus or group on which his attention was focussed and studying them thoroughly from the horticultural standpoint. He could not, however, be induced to supplement the notes which he made and often published, by the preservation of authentic specimens; as a consequence much of the varied and valuable information so carefully acquired disappears with his decease; a circumstance which intensifies the regret which his death causes, not only to those who fully understood him and appreciated his many high qualities, but to those who only knew him as a keen and competent student of garden plants.

Seeds of Chinese Trees and Shrubs.—Kew has lately received through Mr. J. C. Williams and Mr. A. K. Bulley a quantity of seeds collected in South-Western China by Mr. Forrest. The plant collector's work has always been attended with perils—sometimes of climatic, sometimes of human origin—but from what has been recounted in the public press of Mr. Forrest's adventures, we may judge that few indeed of the long line of plant collectors, which began with Francis Masson in 1772, have encountered more hardships and perils from both these agencies than Mr. Forrest. The country traversed by this intrepid collector is considerably to the south of that explored by Henry and Wilson, and the respective floras whilst presenting much the same general features are, no doubt, in many ways distinct. That of Mr. Forrest's country had in part been revealed by the work of some of the earlier Jesuit missionaries, notably by Abbé Delavay.

Among Mr. Forrest's seeds (of most of which the genus only is known), there is a considerable number of rhododendrons, ranging from low matted shrubs to trees 30 feet high. One of the latter, described as having large, pale yellow, fragrant flowers, is of exceptional interest. Will it provide us with the long-desired, yellow-flowered, hardy rhododendron with large leaves and trusses? All the yellow species we cultivate at present, with the exception of *R. campylocarpum*, are of a small Alpine type, and although

very pretty in their way, they are not robust and their charms are of a modest kind. Mr. Forrest describes this new one as growing in the rhododendron forest on the Tali range of mountains at 12,000–13,000 feet altitude. On the same range, at somewhat lower altitudes he obtained seed of two other yellow rhododendrons; these he describes as from 2 to 4 feet high, one with "bright yellow," the other with "deep yellow" flowers.

Of the remainder of the seeds the most interesting are two spruces, two firs, a larch and a cedar. Mr. Forrest seems somewhat doubtful as to the generic identity of the cedar, but we may hope that his estimate is correct. A new cedar would be a great acquisition and, with the deodar growing on the Himalayan ranges, the existence of one on the mountains northward seems at least probable. Maples and Cotoneasters are also in the collection. Unlike the cedars, of which we have still only three (or at most four) species, our gardens are already well stocked with these. All the conifers were collected by Mr. Forrest on the Lichiang range of mountains.

Botanical Magazine for April.—The plants figured are *Clematis aristata*, R. Br. var. *Dennisae*, W. R. Guilf. (t. 8367); *Pseuderanthemum malaccense*, Lindau (t. 8368); *Elaeagnus argentea*, Pursh (t. 8369); *Felicia petiolata*, N.E. Br. (t. 8370); and *Dendrobium muricatum*, Finet, var. *munificum*, Finet (t. 8371).

The Clematis which forms the subject of the first plate is a native of Victoria and is unusual in being a dioecious plant. It is also interesting and beautiful owing to the long salmon-red coloured anther filaments. This character in particular distinguishes the plant from any other form of *Clematis aristata*. Though the plant was probably discovered by von Mueller it was not until 1904 that it was brought to notice and cultivation by Mrs. Dennis of Murngal and Mr. Guilfoyle named it in her honour. It was sent to Messrs. Sander and Sons of St. Albans by Mr. Guilfoyle, and from them a plant was received at Kew which furnished the subject of the illustration.

Pseuderanthemum malaccense is a native of the Malay Peninsula and was sent to Kew by Mr. H. N. Ridley from the Singapore Botanic Gardens in 1908. The figure has been prepared from this plant which flowered at Kew in May, 1910. It is a handsome plant with violet flowers, the lower petal being sprinkled with red dots.

The Silver Berry (*Elaeagnus argentea*), is the solitary species of the genus found in North America, the others being natives of South-Eastern Asia and Japan. The leaves are covered by a close lepidote indumentum which gives them their peculiar metallic lustre.

Felicia petiolata is a pretty little Composite from Basutoland and the Albert division of Cape Colony. It was first found by Mr. T. Cooper in Basutoland in 1861, and was not again collected until 1903 when some ripe achenes were sent with herbarium specimens to Montpelier by Mr. Dieterlin. By this means the plant has been introduced to European gardens. The material for the plate was

supplied by Mr. W. E. Ledger, of Wimbledon, who sent specimens to Kew for identification. At Kew the plant flowers about midsummer.

The Dendrobium is a very remarkable plant, a native of New Caledonia. It differs from the type in the shape of the lip especially in the widely hastate-cordate anterior lobe. The plate was prepared from material received from the Royal Botanic Gardens, Glasnevin, where the plant, presented by Dr. Schlechter, flowered in 1909.

Prunus microcarpa, *C. A. Mey.*—Figures of this species in the flowering and fruiting state were recently published in the Botanical Magazine (tab. 8360). The flowers are represented as having a pink receptacle and calyx and a whitish-pink corolla, and the fruits as green. In the description the colour of the receptacle was given as "pubescens," of the petals as "albo-rosea vel alba," and of the fruit as "ruber vel luteus," whilst in the accompanying English text it was pointed out that the fruits in our climate are "liable to fall while still green." The plant from which the plate was prepared was acquired from Zoeschen. Since the publication of the plate in question Dr. G. Dieck of Zoeschen has kindly supplied some information concerning the plant which he recently received from Mr. R. Strauss, British Vice-consul at Sultanabad (Persia), together with coloured drawings made from wild specimens. According to Mr. Strauss the plant is a dwarf shrub in the neighbourhood of Sultanabad, but grows up to man's height on Kuh Perru (Luristan). The fruit, he says, sometimes reaches the size of a pea and has a sweetly-acid taste like a ripe sour-cherry. The figures represent the dwarf, rigidly divaricate form which corresponds to the *Cerasus diffusa* of Boissieu and Haussknecht such as I observed in the province of Farsistan. The receptacle is shown dark purplish-brown, the petals white and the fruits dark red; but as to the latter Mr. Strauss observes that there is also a variety with "fruits yellow as a Quince." These statements bear out the remarks made in the Botanical Magazine as to the variability of the plant, and it is only to be hoped that in normal summers and in situations with a maximum of available sunshine this pretty shrub may also be able to ripen its dainty fruits in our country.

O.S.

Cypripedium Thunbergii.—There is a handsome Japanese Cypripedium in cultivation whose correct name has been the subject of much uncertainty, though recent views have attributed it to *C. Thunbergii*, Blume. As the species has been figured for the Botanical Magazine and there was some doubt as to the correctness of this determination, application was made to the authorities of the Rijks Herbarium, Leiden, for the loan of the original specimen of *C. Thunbergii*. An examination and comparison of this specimen with other Japanese specimens and drawings shows that two very

distinct species have been confused. The object of the present note is to clear up this confusion so far as the materials available permit.

Cypripedium Calceolus, L., was enumerated by Thunberg as a Japanese plant in 1784 (Fl. Jap. p. 30) with the Japanese name "Atsmori so," and the brief record of locality "Crescit hinc inde." Blume in 1858 described this Japanese plant under the name of *C. Thunbergii* (Coll. Arch. Archip. Ind. et Jap. p. 169, t. 60, fig. 2), remarking that it differed from *C. Calceolus*, L., in the shape of the staminode and in the larger perianth segments. The description and figure were based upon a specimen cultivated at Jedo and preserved in the Herbarium at Leiden. The colour is not recorded, but the figure shows a staminode with acute basal angles, and a distinctly 5-lobed lip, the latter character quite anomalous in the genus.

Miquel, some ten years later, reduced *C. Thunbergii*, Blume, to *C. macranthum*, Sw. (Prolusio Fl. Jap. p. 142), but was not able to add anything to the history of the plant, having only seen the unique original specimen.

In 1876 Franchet and Savatier recorded the plant (Enum. Pl. Jap. ii. p. 40), as *C. macranthum* var. β *ventricosum*, Reichb. f., citing figures in two Japanese works, but giving no character. They, however, cite the Japanese name "Ats' mori so," and mention two Japanese localities.

In 1903 Pfitzer, in monographing the genus (Engl. Pflanzenreich, Arch. Pleon. p. 36), separated *C. Thunbergii*, Blume, giving *C. macranthum*, Franch. et Sav. nec Swartz, as a synonym, but he was only able to cite the original specimen at Leiden, repeating some of the details of Blume's figure.

In 1905 Matsumura (Index Pl. Jap. ii. p. 242), included the whole of the plants previously mentioned under *C. Thunbergii*, also *C. Calceolus* var. *Atsumori*, Morren (to which he gave no reference), and *C. macranthum* var. *ventricosum*, Reichb. f.

Lastly, the writer, in 1908 (Orch. Rev. xvi. p. 186), separated the Japanese plant from the Siberian *C. macranthum*, Swartz, but followed Matsumura in calling it *C. Thunbergii*, Blume, a view which now proves erroneous.

The plant which Matsumura calls *C. Calceolus* var. *Atsumori*, Morren, is clearly *C. Atsmori*, Morren, described and figured in 1851 (Belg. Hort. i. p. 171, t. 21, fig. 1), from a specimen which flowered at the Botanic Garden, Ghent, and which is said to have been received from Siebold among a number of other living plants from Japan, and its differences from *C. Calceolus*, L., and *C. cordigerum*, Don, were pointed out. It has narrower sepals and petals than *C. Thunbergii*, Blume, while the staminode is also narrower, and without the acute basal angle shown in the latter. Thus the identity of the two remains somewhat doubtful in the absence of more complete materials.

We now come to the two Japanese figures cited by Franchet and Savatier. So moku Zusetsu, xviii. t. 83, is a figure in black and white, labelled *C. macranthum*, Sw. It is said to be indigenous in Japan, but is very different from *C. Thunbergii*. Honzo Zufu, xxxix., t. 19, is a coloured figure of a quite different plant, and

may possibly represent *C. Thunbergii*, Blume. It is shown as an erect plant, with three leaves and a leaf-like bract, a solitary flower with brownish-yellow sepals and petals, and an oblong white tip tinged with pink beneath. The staminode is not represented, and the colouring of the lip is probably erroneous, for in the Japanese text the flower is described as "yellow" (as kindly deciphered by Mr. Takeda). On the other side of the same page, however (t. 18, recto) is a coloured plate of the macranthum-like species figured in So mokou Zusetsu, the colour being shown as white, with numerous rose-pink lines on the sepals and petals, and numerous rose-pink spots on the lip. The latter detail is probably erroneous, for otherwise it agrees well with the Japanese plant now in cultivation, and Mr. Takeda says that it represents the common Japanese species. This is the plant mentioned by Franchet and Savatier under *C. macranthum* as a doubtful species.

We have therefore evidence that two quite distinct plants are now confused under a single name, one being the common Japanese species, now erroneously called *C. Thunbergii*, the other the true *C. Thunbergii*, Blume, whose history is still very imperfectly known. Whether there is a third species is at present doubtful. The former apparently requires a new name. The following is the revised synonymy.

C. Thunbergii, *Blume*, Coll. Archip. Ind. et Jap. p. 169, t. 60, fig. 2; Pfitzer in Engl. Pflanzenreich, Arch. Pleon. p. 36, fig. 9 A, 16 D.

C. Calceolus, Thunb. Fl. Jap. p. 30. nec L.

C. macranthum, Miq. Prol. Fl. Jap. p. 142, nec Swartz.

? *C. Atsmori*, Morr. in Belg. Hort. i. p. 171, t. 21, fig. 1.

? Honzo Zufu, xxxix. t. 19.

Japan, without precise locality.

Only certainly known from Blume's original specimen. His figure of the lip is incorrectly drawn, the infolded angles of the side lobes, which are invariably included within the pouch in *Cypripedium*, being represented as a pair of free external lobes. The character is repeated by Pfitzer. The species seems to have been lost sight of; perhaps the present note may lead to its rediscovery, and to the clearing up of the doubtful points respecting it. It seems most allied to *C. Calceolus*, L., and the Himalayan *C. cordigerum*, Don.

C. speciosum, *Rolfe*; a *C. macrantho*, Swartz, floribus pallidis roseo-striatis et staminodio acutiore differt.

C. macranthum var. *ventricosum*, Franch. et Sav. Enum. Pl. Jap. ii. p. 40, excl. syn., nec Reichb. f.; Matsumura, Nomencl. Pl. Jap., p. 63.

C. macranthos, Finet, in Bull. Soc. Bot. Fr. xlvii. p. 285, nec Swartz.

C. Thunbergii, Matsumura, Index Pl. Jap. ii. 242, excl. syn., nec Blume; Rolfe in Orch. Rev., xvi. p. 186.

So mokou Zusetsu, xviii. t. 83; Honzo Zufu, xxxix. t. 18 (recto).

A common Japanese species, hitherto confused with the preceding and with the Siberian *C. macranthum*, Swartz, but differing from the latter in the colour of the flowers, which are white or pink veined with rose, and in some small details of floral structure. It

will be fully characterised in the Botanical Magazine, t. 8386. Both it and *C. macranthum* have been cultivated in quantity during recent years.

According to Matsumura, the species extends as far north as Urup, in the Kurile Islands, but I have not seen specimens from there or from the Island of Yezo. R. A. R.

A Forest Flora of Chota Nagpur.[1]—The area with which this work deals is that portion of the highland region of Central India which is included in the political province of Bengal. Mainly composed of the administrative division of Chota Nagpur with the tributary state of Gangpur on its south-western border, it also takes in a single district, that of the Santal Parganahs to the north-east, which belongs to another division. The addition of this last district is fully justified; it is an outlying one only in an administrative sense; topographically and botanically it forms an integral part of the upland country to the west of the lower and to the south of the upper portions of the great Gangetic Plain. The work, which has been drawn up primarily with reference to forest requirements, is directly benefited by the limitation of area which has been adopted, since it thereby includes practically the whole of the western forest divisions of Bengal. The addition of an excellent map enables the topographical features of the area to be readily understood and appreciably increases the usefulness of the book.

The author, who has lived much and travelled extensively within this tract of country, is on this account, as well as because of the long and careful study he has bestowed on its vegetation, well qualified to prepare a satisfactory flora. The introductory remarks are concise and well put, and satisfy the reader that he knows the region well and that he fully appreciates the factors which have decided the character of its vegetation. Unfortunately, departmental needs have debarred him from discussing fully those elements of the Flora which cannot be claimed as "economic." But for what he has given us we are grateful because we find, when the technical portion of the work is examined, that this is in no sense a compilation; it is clearly the result of careful and independent study, while the resulting views are stated with much judgment and caution.

The map, compiled by the Forest Survey and published by the Survey of India, sustains the reputation of these departments. The appearance of the book, however, is not attractive. But in spite of this drawback, this Forest Flora should form a useful companion to those residing in the area with which it deals who may be interested in its vegetation.

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[1] H. H. Haines: A Forest Flora of Chota Nagpur; pp. xxxvii +634, with a map: Calcutta, 1910.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 5.] [1911.

XXIV.—ON THE BALSAMINACEAE OF THE STATE OF CHITRAL.

J. D. Hooker.

Geographically the State of Chitral is of interest as occupying the limited area in which the four great Asiatic dominions approximate or meet, British on the south-east, Afghanistan on the west, Russian on the north-west and Chinese on the north-east. Its latitude, 34–36° N. and longitude 71–73° E., reach the extreme north of the British possessions in Asia. Botanically it occupies the extreme north-west of the Himalayan flora. It is a mountainous member of the great Hindu Kush range, consisting of barren stony tracts alternating with cultivated valleys, limited forests, pastures and naked or snow-capped peaks. The indigenous flora commences at an elevation of 3000 ft. and ascends to between 14,000 and 15,000 ft., and is described as remarkable for the prevalence in summer and early autumn of species of *Impatiens* at medium elevations.

The collections from which a knowledge of the flora of Chitral has been obtained have been formed almost exclusively by officers of the British and Indian armies engaged in military operations in and after 1895, the year of the despatch of the Chitral Relief Expedition, up to and inclusive of which year more than 924 species (upwards of 800 of which are flowering plants) had been collected, as recorded by Mr. Duthie, F.L.S. (late Director of the Botanical Department of N. India), in a valuable essay entitled "The Botany of the Chitral Expedition, 1895," published in the "Records of the Botanical Survey of India," Calcutta, vol. ii. (1898), p. 140. In the pages prefacing that essay Mr. Duthie has discussed the physical features, climate, &c. of Chitral, and mentions General Gatacre, C.B., D.S.O., in command of the advanced brigade, as having, with

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the co-operation of Surgeon Lt.-Col. Hamilton, collected botanical specimens from the commencement of the campaign. He includes a few species collected in 1894 by Capt. (now Col.) Sir Francis Younghusband, K.C.I.E. More recently an extensive, carefully ticketed and beautifully preserved herbarium of Chitral plants has been formed by Lt. Toppin, R.A., who has kindly sent to me the Balsams it contained, and who, having been transferred to Burma, has induced two brother officers remaining in Chitral, Major Wall and Lt. Stirling, to collect for me. I am already indebted to these gentlemen for two species, one, *I. Thomsoni*, not found in Chitral by other collectors.

In Mr. Duthie's essay six species are enumerated, of which three are correctly identified, *I. Balsamina*, *I. Roylei*, and *I. brachycentra; I. amphorata*, Edgew., is *I. Lehmanni*; *I. laxiflora*, Edgew. and *I. scabrida* are, I think, both *I. Edgeworthii*.

The North-West Himalayan flora which extends from the Nepal frontier to Afghanistan contains, as at present known, nearly 40 species of *Impatiens* of which only about eight have been found east of Nepal, in Sikkim, where about 80 species in all have been collected. No doubt many both of the N.W. and Sikkim species enter Nepal, which itself must contain many endemic forms of the genus in the thousand miles of the Himalaya that it covers, and which are a terra incognita geographically and botanically. Of the Chitral species two alone, *I. Balsamina* and *I. Thomsoni*, are found eastwards as far as Sikkim.

Returning to the north-west, the Chitral Balsams no doubt enter the conterminous Afghan northern province of Kaffristan and there disappear, the climate of the western and southern regions of that kingdom, as of Persia, being prohibitive. No Himalayan member reappears in the Caucasus, where the only species known to me is *I. nolitangere*, L., which ranges continuously from Britain to Japan but nowhere enters India. It is remarkable that *I. bicolor*, Royle, which is perhaps the most common N.W. Himalayan species at 4000 to 11,000 ft., has not been found in Chitral.

To the following list of Chitral species I have added their distribution and brief diagnoses which will enable an amateur in Chitral to recognise them. The leaves of all, except *I. Roylei*, are alternate.

A. Inflorescence simply pedicelled in the axils of the leaves.

* *Flowers white, rose-pink or purplish.*

1. *I. Balsamina*, L.; leaves lanceolate, serrate, flowers pink, capsule short, densely tomentose.

Alt. 4000–5000 ft. *Hamilton, Toppin.*

Distrib. throughout India, Malaya, China.

B. Inflorescence peduncled, peduncles 2—many-flowered.

* *Flowers white, rose-pink or purplish.*

2. *I. Roylei*, Wahl.; leaves opposite, alternate, and whorled, serrate, flowers white and pink or purple, capsules short, clavate, glabrous, deflexed.

Alt. 6000–10,000 ft., *Gatacre.*

Distrib. southward to Murree and eastward to the Nepal frontier.

3. *I. Lehmanni*, Hk. f. et Thoms.; leaves ovate, crenate, pedicels subumbellate at the top of the peduncles, flowers rose-coloured or purplish, variable in size, capsule linear, decurved or deflexed.

Alt. 7500–11,000 ft., *Gatacre*, *Harriss*, *Toppin*, *Wall* and *Stirling*.

Distrib. E. Afghanistan southward to the Kurrum Valley and Cabul.

4. *I. Flemingii*, Hk. f.; leaves ovate, serrulate, bracts minute, flowers small, white or pale pink, capsules slender, erect.

Chitral, *Gatacre*, in Herb. Hort. Petrop.

Distrib. southward to Murree and eastward to Kiashtwar.

5. *I. Thomsoni*, Hk. f.; leaves ovate, crenate, bracts at base of pedicels elongate, very narrow, flowers rose-coloured or purplish, capsules linear or subclavate, deflexed.

Chitral, *Wall* and *Stirling*.

Distrib. throughout the Western Himalaya; alt. 8000–10,000 ft., also Sikkim.

6. *I. Harrissii*, Hk. f.; leaves ovate, crenate, peduncles 2-flowered, bracts ovate-lanceolate, membraneous, flowers rose-coloured? capsules short, narrow. A doubtful species.

Chitral, *Harriss*, in Herb. Hort. Petrop.

7. *I. brachycentra*, Kar. et Kir.; leaves crenulate or crenate-serrate, peduncles many-flowered, flowers very minute, white, capsules slender, erect, clavate.

Alt. 7000–9000 ft., *Gatacre*, *Harris*, *Toppin*.

Distrib. southward and westward to Kurrum Valley, Afghanistan, and eastward to the borders of Nepal, ascending to 14,400 ft.; also Alatau Mts. in Russian Asia.

* *Flowers golden-yellow*.

8. *I. Edgeworthii*, Hk. f.; leaves ovate, crenate-serrate or serrulate, peduncles few, or many-flowered, bracts persistent, flowers 1·5-2·5 cm. broad, lower lobe of lip produced upwards into a straight or decurved lobule, capsules linear or clavate, erect—very variable in size and habit.

Alt. 6000–8500 ft., *Gatacre*, *Harriss*.

Distrib. S.E. to Kulu; alt. 3000–9500 ft., frequent.

XXV.—NOTES ON TREES SUITABLE FOR EXPERIMENTAL FORESTRY.

W. Dallimore.

Though but a small number of trees are grown to any considerable extent under forest conditions in the British Isles, there are others which would be well worth a trial, for it is probable that some of them would turn out to be quite as useful as the few exotic species which hold their own with native trees in our woodlands, were they planted under similar conditions. Considerable support is given to this idea by much that has been written and by recommendations which have been made, with regard to British forestry, during the last few years, for among trees which have been spoken highly of for general planting, there are at least two, Douglas fir and Sitka spruce, which have but recently emerged from the experimental stage as regards forest

planting, though they have been known as good ornamental trees for many years. It is also of interest to note that the forest authorities of several countries where afforestation is being conducted on systematic principles, have found that certain exotic trees give better results under some conditions than native species. For evidence of this, attention may be directed to the planting of Australian Acacias and Eucalypts and *Pinus canariensis* and *P. halepensis* in South Africa; the substitution of various North American, European and Australian, for native trees in New Zealand, (*see* Report on "State Nurseries and Plantations" for the year ending March 31st 1910, issued by the Department of Lands, New Zealand), and the "Report of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii" for the biennial period ending December 31st 1910, in which the following paragraph occurs on page 39:—"The native Hawaiian forest is, as has been pointed out earlier in this report, of the greatest value as a watershed cover, but from the commercial standpoint much better results can be got from introduced species than from Hawaiian trees."

The fact that certain timber trees which are of commercial importance in their native countries give excellent results when grown as ornamental trees in the British Isles, would appear to be a sufficient guarantee that they will thrive under silvicultural conditions in the same localities; but it would not be safe to recommend extensive plantations solely on that account. It is necessary to find out first whether such trees possess an advantage over those already grown, which produce timber suitable for the same purposes, either by better growth, earlier maturity, better disease-resisting qualities, more vigorous constitution, superior quality of timber and the like. Some apparently suitable species have been already condemned in certain quarters, for the reason that the wood produced by garden-grown trees has been coarser and inferior in quality to imported wood. This, however, can hardly be taken as a fair guide to the marketable value of any particular kind of timber, and it would be unwise either to extol or condemn a species simply on account of the quality of the timber produced by trees grown for ornamental purposes. Before commencing the culture under forest conditions of any tree about which little is known, a certain amount of preliminary experimental work is necessary, and even with certain well-tried trees, it is unwise to form extensive plantations in quite new localities without testing their possible behaviour beforehand. Take the Douglas fir in two midland counties as an example; in Shropshire it grows well and is considered to be an important tree for future planting, whilst in certain parts of Derbyshire it has been tried time after time with most disappointing results. Another case in point where experiments with one of our commonest trees have proved it to be unsuitable for certain positions where it once formed the principle feature, is the planting of bog-land with Scots pine. Buried in the peat, roots and trunks of this pine are found, yet it will not grow in those places now owing to the altered conditions. Experiments, however, have proved that an American spruce, *Picea sitchensis*, is able to hold its own where the native tree has

failed. Other instances of discoveries of likely forest trees within recent years, from amongst the ranks of ornamental specimens, are the Japanese larch, which is found to grow more quickly and resist disease better than common larch, and Corsican pine, which for certain positions is an improvement on Scots pine.

Experiments in the past, however, have not gone far enough, and discoveries which have been made have been due largely to the fondness of certain individuals for a few kinds of trees. With experimental work of this sort it is very necessary that full records both of successes and failures should be reported, for as much information may often be obtained from one as from the other.

Within the last eight years an experimental forest has been formed at Avondale in Ireland. It is under the control of the Board of Agriculture for Ireland, and 106 acres, divided into 91 plots, have been planted with various kinds of trees. A description of the work carried on there is to be found in the "Quarterly Journal of Forestry," v., Jan. 1911, pp. 58–60. As yet it is too early to gain definite information as to how certain trees are likely to thrive, but North American conifers are said to be doing well while broad-leaved trees appear to require more sun. This makes it evident that more than one experimental area is necessary if trees are to be thoroughly tested. A certain amount of experimental planting might well be carried on by landowners giving up small woods or spinneys to single kinds of trees or to a mixture of several kinds, but to carry the work on in a systematic manner a more ambitious scheme is necessary, for it is only by having blocks of trees growing side by side, under similar conditions, that correct comparisons can be made. Neither ought the blocks to be very small, at least half-an-acre would be required for each experiment to do it justice, and it would be necessary, for the guidance of future generations, to preserve strict accounts of each experiment from the time of sowing the seeds onwards. Needless to say such an area would be of the greatest importance to intending planters, whilst once the necessary knowledge of the possibilities of a certain kind of tree for forest planting had been obtained by the evidence of its behaviour in a trial block, its success or otherwise, as an ornamental specimen, might well be taken as a guide to its suitability for any special locality.

In the following notes trees of commercial standing are dealt with which thrive satisfactorily as ornamental specimens in the British Isles. References as to the value of the timber for various purposes are taken from Hough's "American Woods"; "Timber," by J. R. Batterden; "Timber and Timber Trees," by Thomas Laslett; and "Timbers of Commerce," by Herbert Stone.

Descriptions of the American trees mentioned are to be found in the "Silva of North America," by Prof. C. S. Sargent, and references are taken from the "Trees of Great Britain and Ireland," by H. J. Elwes and A. Henry, and from other works with regard to the behaviour of various trees in this country. In some instances directions of culture, as recommended by the United States Department of Agriculture in various Forest Planting Leaflets for American trees, are given as a possible guide for intending planters.

I.—American Broad-leaved Trees.

The Tulip Tree (*Liriodendron Tulipifera*, L.).—This is one of the most important broad-leaved timber trees of North America, and a large amount of timber finds its way annually into the markets of the United Kingdom under the names of yellow poplar, white poplar, canary whitewood and white wood. The wood is described as being light, fine and straight-grained, easily worked and yields a good finish. Some qualities are white, others pale yellow and others marked with brown. It is in request for many of the uses to which the better classes of deal are put in the interior finish of houses, such as doors, panels, wainscoting and casing for electric-light wires, while it enters largely into the cabinet trade both as a foundation for veneer and for constructive purposes. A full description of the wood and its uses is given in Hough's "American Woods," i, pp. 40–42. The current price for the wood in London, according to Messrs. Churchill & Sim's Wood Circular for April 4th, is from 1*s.* 6*d.* to 1*s.* 9*d.* a cubic foot for logs.

The species has a wide distribution in N. America, for it occurs from southern Canada to N. Florida and S. Alabama. Average-sized trees would appear to be from 100 to 125 feet high, with a diameter of from 3 to 6 feet, the boles being clear of branches for two-thirds of their height. Under the most favourable conditions, however, when growing in the valleys of the Southern States, it is found from 160 to 190 feet high with a trunk up to 10 feet in diameter. J. N., writing in Woods and Forests" for 1884, p. 446, describes a tulip tree which he saw in Virginia as being 210 feet high, branchless for 100 feet, 42 feet in girth at 5 feet from the ground, with a branch spread of 150 feet. In the "Garden and Forest" for 1897, p. 458, a log exhibited at the Nashville Exhibition, by the Nashville Chattanooga and St. Louis Railroad Co., is mentioned which measured 42 feet in length, 10 feet 4 inches in diameter at the butt, and 7 feet at the small end. It was estimated to contain 1260 cubic feet of timber and was cut from a tree about 600 years old.

For purposes of comparison, trees grown under ornamental conditions in the British Isles, have been recorded from 80 to 107 feet in height, with girths ranging from 10 to 17 feet at 5 feet above the ground. These dimensions may be considered to compare with those of average-sized American trees. The largest specimens are met with from the north Midlands to the south of England, but good examples have been noted in Scotland. It is difficult to form an accurate idea of the age of the larger trees, but they probably range from 100 to 150 years. This would place the maturing age in England about on a level with that of beech.

A full account of the tulip tree and its behaviour in the British Isles, together with particulars of many large trees, is given in "Trees of Great Britain and Ireland," i., pp. 65–74. The largest tree mentioned, now dead, grew at Stowe, near Buckingham. Mr. Elwes found this tree to be 107 feet high with a clear bole of 30 feet and a girth of 13 feet at 5 feet from the base and 21 feet 4 inches near the ground. A tree growing at Leonardslee, the seat of Sir E. Loder, Bart., near Horsham, when measured in 1903, was 97 feet

high, with a clean straight trunk of from 25 to 30 feet. It was at that time considered to be about 90 years old. A fine tree nearly 100 feet high was noted at Margam in S. Wales a few years ago.

The best trees are found growing on well-drained, loamy soil, where plenty of moisture is obtainable, but good examples are to be met with on both clayey and very light soils. It does not thrive on wet, badly drained ground, neither is it a success in soil of a limy character. Specimens at Kew may be noted growing on both light and heavy land. The old specimen near the north end of the Rhododendron Dell is on sandy ground, whilst the position occupied by a tall tree in the Azalea Garden is marked by the soil being of a clayey nature.

A "Forest Planting Leaflet," Circular 93, on this tree, has been published by the United States Department of Agriculture. In it the tree and its requirements are fully described. For the benefit of possible planters the following notes have been extracted. Seeds are produced abundantly nearly every year, though only 5 to 10 per cent. are fertile. Those sown as soon as ripe germinate the following spring, but if the seeds are kept and sown in spring they have a tendency to lie in the ground a year before germinating. Seedlings should not remain in the nursery for more than two years, for after that time they are difficult to transplant successfully. The tree is intolerant of shade and prunes itself well with even moderate side shade. Seedlings can endure moderate shade, but more light is demanded as the trees grow older. At maturity they are usually taller than their associates and their crowns are fully exposed. Growth is rapid for 50 years, after which it gradually decreases. Spacing is recommended at 6 feet apart each way, and mixed planting is preferred to a pure stand. On rich land in sheltered valleys, it is used as the predominant feature of plantations, but in more exposed positions other species are planted in excess. Any shade-enduring hardwood with white pine and Norway spruce are recommended as companion trees. For planting in this country it is probable that Scots or Corsican pine and spruce would form good nurses. An account of the species and details of its distribution in America may be found in the Silva of North America, i., pp. 19–20.

The Black Walnut (*Juglans nigra*, L.).—There is reason to believe that this tree will be worth growing for its timber in certain parts of the British Isles, for it thrives in many localities and appears to be no more susceptible to late spring frosts than the common walnut. American-grown timber is imported in large quantities and is put to many purposes connected with the manufacture of the better classes of furniture. It is dark brown, or sometimes almost black, in colour, and may be obtained in wide boards or logs. The wood is often clean and straight-grained, though it may be finely figured. Burrs are produced, as in the common walnut, and these, and the best marked logs, command fancy prices for veneer. Elwes, in "Trees of Great Britain and Ireland" ii., p. 270, says that English-grown wood is quite equal to imported wood in colour, and when properly seasoned is as good as the best Circassian or Italian Walnut.

This favourable opinion appears to have been formed by a London timber merchant also, as long ago as 1883, for in a note in "Woods and Forests" for December 5th of that year, he recommends the tree to the attention of foresters as a suitable subject for forest planting. With regard to a tree growing at Syon, he gives the length of the trunk as 25 feet and its quarter girth as 24 inches, its market value being £25 or 5*s*. a cubic foot. At that time the tree was about 50 years old. He also refers to another black walnut as follows. "Singularly enough, I bought one as an elm out of a garden not 300 yards from my sawmill, so I am fortunately able to send you a specimen of the English-grown wood; it was about 15 feet long by 20 inches quarter girth, and had forty annual rings. You will note that the wood has obtained from our English soil the very character American wood is so deficient in, viz., hardness and weight, approaching in this respect the character of Italian walnut, or what is represented by the words 'good quality.' I am now making from this tree a sideboard which will, I think, be a beautiful specimen of woodwork." A section of Kew-grown timber on view in the Forestry Museum, shows that the wood is capable of taking a high polish. The price of imported wood in April of the present year varied from 2*s*. a cubic foot for inferior qualities to 5*s*. a cubic foot for the better samples. Boards realised somewhat higher prices.

Juglans nigra is a native of N. America, being found widely distributed from southern Ontario to the Southern United States. Details of its distribution and botanical characteristics are to be found in Sargent's "Silva of N. America," vii., pp. 121–124, while other information on these points, together with notes on the behaviour of the tree in this country, may be derived from "Trees of Great Britain and Ireland," ii., pp. 262–270. It is said to vary considerably in size, mature specimens being met with from 50 to 150 feet high, the girth varying from 6 to 20 feet. In England the largest trees vary from 80 to about 116 feet in height, with girths from 10 to 14 feet. Two of the largest trees known are in Marble Hill Park, Twickenham, and Syon House Park, Brentford. The former when measured by Mr. Henry was 98 feet high by 14 feet 3 inches in girth, and the latter as recorded in "Trees and Shrubs at Syon House," 1910, 116½ feet high by 13 feet 7 inches in girth.

The United States Department of Agriculture has issued a "Forest Planting Leaflet," Circular 88, on this tree, and it may be of interest to refer to a few of the principal points discussed therein. Its trunk is said to lengthen into a tall tapering column, often with no limbs for a distance of 50 or 60 feet. The usual height of mature forest-grown trees is given as from 70 to 90 feet with a diameter of from 30 to 45 inches, and 75 years is given as an average marketable age. It is intolerant of shade, matures with a thin head of branches and rarely prevents the growth of grass and weeds beneath. Though sometimes raised in nurseries and transplanted to permanent places when quite young, recommendations are made that seeds should be sown where the trees are to grow in order to avert the risk of transplanting. Intervals of 6 or 8 feet are advised to be left each way between the trees, the intervening spaces being planted with some shade-enduring species in order to suppress the side branches.

The cultivation of the black walnut in this country would probably need to be carried on below an elevation of 500 feet, the more sheltered positions being selected and preference given to land such as may be expected to grow good oak. Planted 7 feet apart with silver fir or hornbeam between should prove to be a suitable arrangement. Providing it is found possible to cultivate the species successfully under forest conditions, its timber ought to be more remunerative than that of oak, if present prices can be taken as a guide. Fertile nuts are produced freely by the older trees in this country. As an illustration of the rate of growth on light soil, a transverse section of a trunk measuring 2½ feet in diameter, grown at Kew, shows 95 annual rings.

The White Ash (*Fraxinus americana*, L.).—As seen under cultivation in England, even when growing as an isolated tree, the white ash rises with a clean, straight trunk to a considerable height, the branches being small and the head narrow. Compared with common ash, *F. excelsior*, L., growing under similar conditions at Kew, it is of more rapid growth and appears less susceptible to attacks by scale insects. Several moderately young, healthy examples may be noted in the vicinity of the Azalea Garden, one isolated tree being 66 feet high with a girth of 2 feet 9½ inches at 5 feet from the ground. It has gained 3 feet in height and 4½ inches in girth since measured by Mr. Elwes in 1907. Unfortunately its age is not known, but judging from its growth during the last 15 years it is probably about 40 years old. Two older specimens are to be seen on the south side of the mound near the Cumberland Gate. Both are upwards of 80 feet high and girth 8 feet 5½ inches and 8 feet respectively at 5 feet above the ground.

White ash timber may be used for all the purposes to which the wood of the common ash is put, whilst David Denning, in "The Art and Craft of Cabinet-making," 1891, says that "it is superior to English ash for furniture as it is usually of better colour." It is imported largely for numerous purposes. There is no reason to believe that it would command a better price than English ash, though it may be suitable to plant on account of its rapid and vigorous growth. Details of its distribution in N. America together with its botanical characteristics are to be found in Sargent's "Silva of N. America," vi., pp. 43–45, and additional information is given in the "Trees of Great Britain and Ireland," vol. iv., pp. 901–905. "Forest Planting Leaflet," Circular 84, United States Department of Agriculture, is devoted to this tree, and the following remarks bearing upon its habits and growth are extracted therefrom. Its average height is from 70 to 80 feet with a diameter of from 2 to 3 feet. Plantations are found to give the best results in protected valleys on sandy loam that is light and easily worked. It will thrive, however, in less favourable and even in adverse localities. A porous subsoil is essential, and a water table at a depth of 10 or 12 feet is of decided advantage. Mature trees can endure only a moderate amount of shade, while young seedlings will start in dense shade but require considerable light for their perfect development. Its economic uses are referred to as follows: "The wood of the white ash is of great economic value. Its most valuable qualities are strength and elasticity,

and these, combined with its ability to take a good polish and to season without injury, make it a timber of first rank for furniture, car and vehicle construction, interior woodwork, agricultural implements and tools."

American-grown seeds would need to be obtained for starting a plantation, and care should be taken to order from a firm able to supply the true tree and not one of its near allies. The percentage of fertile seeds is said to be low, hence the necessity for rather thick sowing. Young trees are planted in permanent positions in America when a year old. In some instances it is planted as a pure crop, allowing spaces of from 4 to 6 feet between the trees, and at other times it is planted as a mixed wood; black walnut, black cherry, hackberry, hardy catalpa, Scots pine and European larch being recommended for companion trees. It is probable that pure plantations in this country might be made at 3 or $3\frac{1}{2}$ feet apart with success, whilst a mixed plantation might contain hornbeam and Corsican pine. Anywhere where ordinary ash grows would suit the white ash, and it might also be planted on lighter soil than that usually allotted to *F. excelsior*.

The Black Cherry (*Prunus serotina*, Ehrh.). — According to reports from American sources the wood of this cherry occupies a similar position in America to that of the common cherry in England, for it is used for cabinet-making, decorative work in houses and various fancy articles. Being of a rich reddish-brown colour and finely grained, it may be manufactured with a handsome finish and it is capable of taking a high polish. As is the case with our native species, however, it has been used so extensively that the present supply is limited. Though there is no reason to believe that it would possess any distinct advantage over the British species, it is well worth a trial, especially as it will bear a moderate amount of shade and thus be able to act as a partner of the ground whereon some light-demanding subject is to be grown. American foresters recommend it for mixing with white ash, silver maple and black walnut. In a recently published book on timbers by J. R. Batterden, "Timber," 1908, the black cherry is referred to on page 98 as follows :— 'The Black Cherry (*Prunus serotina*), a tree 50 to 80 feet high, is especially esteemed and can be obtained in wide boards; cherry mellows and grows richer in colour with age, the varieties with wavy textures are particularly beautiful; the timber is mostly used for cabinet work and furniture, turnery, walking sticks, &c."

Under forest conditions in America the black cherry is said to have a long, slender trunk surmounted by a comparatively small, open crown, composed of large, irregular branches. The trunk is often free from branches for a distance of 70 feet (Circular 94, U.S. Dept. of Agric.). In New England it is said to be of medium size, from 30 to 50 feet in height, with a diameter of from 15 to 24 inches. In the Middle States a height of 60 feet and a diameter of $2\frac{1}{2}$ feet is attained, but the best development is said to occur on moist residual soil of the upper slopes of the southern Alleghenies where a height of 90 feet and a diameter of 4 feet are not uncommon. In this country it will probably not attain more than average growth, although trees planted in poor, sandy soil

have grown to a fair size. The larger trees at Kew measure from 45 to 63 feet in height and are up to 4 feet 4 inches in girth. These are growing in poor, sandy soil. Under natural conditions this tree is found among beech, birch, oak, hickory, black walnut and maple. The above-mentioned circular says that "the black cherry will grow fairly well on dry situations, but it is only in the moist well-drained, rich soils of mild climates that the maximum development is reached. The tree thrives on bottom lands, yet makes a moderate growth on sandy or rocky upland if the soil is penetrable."

"The black cherry is well adapted for mixed planting throughout the Middle West. It serves a useful purpose as a nurse tree in forest plantations and where luxuriant foliage is desired. In general it is too short lived and of too limited economic value to be recommended for extensive planting."

Spacing is recommended at from 4 to 6 feet apart, one year old plants usually being transferred to permanent situations.

At the present moment the value of English cherry wood cannot be said to hold out any recommendation to planters. As with some other kinds of timber, however, the supply for some years past has been so small and so irregular that it has ceased to be looked on as a standard wood, and it is quite probable that were a good supply to be again obtainable prices would go up and it would be sought after. In an interesting article on *P. serotina*, which appeared in "Woods and Forests" for January 9th, 1884, p. 83, a table of prices in the Boston market of six of the principal American woods employed in cabinet-making is given as follows :—

	£	*s.*	*d.*	
Black Walnut	15	12	6	per 1,000 feet.
White Oak	13	10	10	,, ,, ,,
Cherry	12	10	0	,, ,, ,,
Butternut	10	8	4	,, ,, ,,
White Ash	8	6	8	,, ,, ,,
Sugar Maple	8	6	8	,, ,, ,,

The Black Locust or False Acacia (*Robinia Pseudacacia*, L.).—Attempts were made a century or more ago to popularize this tree in England for commercial purposes, and again in 1823 its merits were strongly advocated. Loudon, "Arboretum et Fruticetum," i., gives a considerable amount of information on the subject, and states that about the latter period one man alone sold 1,000,000 trees for the purpose. Unfortunately no records appear to have been kept of these plantations, and apparently all the information that can be gleaned about them has to be extracted from short notes which were published from time to time in various periodicals, 40 to 60 years ago. This evidence is very conflicting, for A. P., Cheam, writing in the "Gardeners' Chronicle" for December 9th, 1843, p. 861, speaks highly of the tree and the durability of its timber. He had removed posts from the ground which had been in use for 20 years, which did not show a sign of decay. Two hundred trees planted by him in 1823 had made very good progress and contained a large percentage of heart-wood. On February 23rd, 1856, we find him

writing again in the same journal, p. 119, and strongly recommending the planting of the tree. He had been cutting from his plantation for several years and found the wood of good quality, whilst the posts referred to in his earlier note were still sound. Replying to A. P., Cheam, R. J. Selby does not consider the tree worth planting as it is very easily damaged by wind. Perhaps the best article on the subject is one by "Tassel" in the "Gardener's Chronicle" for April 14th, 1855, pp. 240–241. He discusses the tree from actual experience and advises cutting at an early age, 30 to 35 years. Planted with larch, Turkey oak and fir it grew faster than the latter two but was over-topped by the larch. He instances an isolated tree which had been planted in 1816; this in 1855 was 60 feet high, and girthed 7 feet 10 inches at the ground, 4 feet 4 inches at 10 feet high and 4 feet at 20 feet high.

The species is a native of the Eastern United States, where it grows to a height of from 60 to 80 feet with a trunk $2\frac{1}{2}$ to $3\frac{1}{2}$ feet in diameter under favourable conditions, though in some places it is much smaller. Its rate of growth in Great Britain compares favourably with American records, while as regards size, it grows almost as large in England as in its native country. The yellowish coloured timber is hard and durable. In America it is used for shipbuilding, tree-nails, hubs for wheels, posts for fencing and various other purposes. In some continental countries the wood of young trees is in demand, both round and split, for vine props and older wood is used for spokes, &c. "Forest Service Circular," No. 64, United States Department of Agriculture, gives the life of a post made from the heart-wood as from 15 to 25 years.

It adapts itself to a variety of soils and conditions, for it flourishes on poor, light land and also in ground of a clayey character. Good specimens are notable both on low land and on hill sides where shelter from rough winds is provided. Suckers are produced freely, and for this reason it has been recommended for planting on loose banks to help to bind the soil. The timber ought apparently to be cut when the trees are between the ages of 35 and 55 years, for older trees often show signs of decay. The scarcity of the false acacia in our woods after being planted somewhat extensively, suggests that it is not suitable for forest planting. In the absence of any definite information on the subject, however, the usefulness of the timber makes it well worth a further trial.

Seeds are ripened freely and form a ready means of propagation. Growth during the early years is rapid, and one year old plants will probably be found to be quite large enough for permanent planting. The species has been found to succeed as a pure crop in America spaced 4 feet apart in the rows and 6 feet between the rows. It has also given good results when mixed with ash. It is one of the trees mentioned in the American "Forest Circular," No. 99, as a suitable subject for planting on the semi-arid plains of Kansas, Nebraska, Oklahoma, &c.

The Black or Cherry Birch (*Betula lenta*, L.).—This is one of several American birches which supply a large amount of timber each year both for home consumption and for export. Some idea of the importance of our imports of American birch-wood may be gathered from the statement made in J. R. Batterden's book

'Timber," p. 104, that 1,500,000 cubic feet were imported into the Mersey in 1906. This wood is received partly in the log, partly as boards, and sometimes worked ready for use. It is employed for a variety of purposes, the better qualities being used in the manufacture of furniture and for cabinet work, while bobbins, shuttles, shoe lasts and other articles are made from the remainder.

B. lenta is described in the "Silva of N. America" ix., pp. 50–52. It is stated to form a tree 70 to 78 feet high with a trunk 2 to 5 feet in diameter. The wood is reported to be heavy, very strong and hard, close-grained, with a satiny surface, susceptible of receiving a beautiful polish. A dark-brown or reddish heart-wood is contrasted with yellowish sap-wood. It is used largely for furniture and in some of the provinces on the Canadian sea-board for shipbuilding. Hough, "American Woods," ii., p. 35, reports very favourably on the wood, and says that it makes a good imitation of mahogany and cherry when polished.

The species is found in Canada and the N.E. United States, and is distinguished from other birches by its aromatic bark and leaves. The bark is of commercial importance in America, for it is collected during late summer and by processes of maceration and distillation furnishes an oil, known as "oil of sweet birch" and "oil of betula," which is used for flavouring purposes ("American Medicinal Barks," by Alice Henkel, Bulletin No. 10, U.S. Dept. of Agriculture). It is also said that beer is made from the sap of the tree.

Planting in this country appears to have been limited, for well-grown trees are rare. Representatives are to be found at Kew, but the older trees have hardly proved so satisfactory as some other American kinds. As the birches are usually fast growing trees a plantation would soon prove its worth. It would be well to try it on somewhat richer soil than that which is usually associated with the growth of birch.

The Yellow Birch (*B. lutea*, Michx.).—The distinguishing features of this species and *B. lenta* are less marked than is the case with other American birches, though the sweet bark of the cherry birch is a good character. Descriptions of both trees are to be found in the "Silva of N. America," vol. ix., and their botanical characteristics are also recorded in "Trees of Great Britain and Ireland," iv. It is found in the N.E. United States and Canada, the better developed trees being up to 80 feet high and 3 feet in diameter. Hough, "American Woods," i., pp. 64–65, refers to the timber as follows:—"Wood hard, close-grained, tough, heavy and very strong, compact, taking a beautiful satiny polish; heart-wood reddish-brown, sap-wood nearly white." Its uses are numerous, for in addition to being employed by wheelwrights and cabinet-makers, it enters largely into the manufacture of chair-bottoms, friction-pulleys and small wooden articles. Young saplings are split for hoops for casks, and burrs from old trees make good mallets and beetles. It would probably succeed best as a fairly dense, pure stand. Pine and spruce might, however, be tried with it to form a mixed wood.

The Paper or Canoe Birch (*Betula papyrifera*, Marsh.).—This is another of the American birches which appears to be worth a trial

in British woodlands, for it grows quite as well as the common birch and produces a good quality timber. Hough, ii., pp. 33–34, describes it as being a favourite timber for such small articles as clothes pins, spools, pill-boxes, shoe-lasts and pegs ; he also says that it is used for wood-pulp and for furniture. Its bark was formerly an object of considerable importance to the North American Indians, for in addition to fashioning their canoes from it, it furnished them with waterproof tent covering, baskets, and various other commodities. In Museum No. 1 at Kew an interesting series of articles manufactured from the bark of this tree may be seen.

The paper birch is found further north than any other deciduous American tree, and under favourable conditions grows to a height of 80 feet with a diameter of 3 feet. According to Bulletin 47, "Trees and Shrubs tested in Manitoba and the North-West Territories," published by the Department of Agriculture, Ottawa, Canada, it is about equal to *B. alba*, L. for hardiness and stands better than either *B. lenta* or *B. lutea*. It grows well at Kew in poor sandy soil. The largest specimen is 50 feet high with a girth of 4 feet at 5 feet from the ground. All the birches are suitable for close planting in pure stands, and they may also be mixed with spruce or pine. (For full particulars of this tree and its uses *see* "Paper Birch in the North-east," Forest Service Circular, 163, U.S. Dept. of Agric.).

The River or Red Birch (*Betula nigra*, L.).—Though of less importance than the birches already referred to, this species grows freely enough to warrant a trial under forest conditions. Hough describes it as a tree 80 feet high by $2\frac{1}{2}$ feet in diameter, extending from Massachusetts southwards to Florida and westwards to Iowa, Kansas and Texas. Its wood is said to be "rather hard, strong, close-grained, compact, with fine medullary rays, yielding a smooth finish ; used in turnery, woodenware, shoe-lasts, &c." Under natural conditions it is found inhabiting moist land, such as banks of streams and marshy places. That it grows fairly well on dry ground, however, is shown by several good specimens which are growing in the natural sand at Kew. One of the best, standing near the Victoria Gate, is 55 feet high and 4 feet 10 inches in girth at 5 feet above the ground. *B. nigra* may be distinguished amongst other birches by its rough, reddish-brown bark.

The Oregon Maple (*Acer macrophyllum*, Pursh.).—This is one of the most important of several American Maples which are likely to prove useful for British woodlands, for it grows quickly, forms a large tree and its timber is of good quality. Although introduced a century ago it is not common, but some good examples have been noticed in a few places. In the "Silva of N. America," ii., pp. 89–90, it is described as forming a tree up to 130 feet high with a girth of 15 feet. It is found along the Pacific Coast, below 2000 feet elevation from Alaska to S. California, and appears to reach its maximum dimensions in the moist climate of Vancouver Island and the adjacent mainland. The timber is said to be of good quality, light, soft, close-grained and capable of receiving a beautiful polish. In "Trees of Great Britain and Ireland," iii.,

p. 683, the wood is said to be equal in beauty and similar in character to that of other eastern maples, and is more valued than any other native hardwood in British Columbia and Washington. The largest tree known to Mr. Elwes in this country is growing at Boynton, in Yorkshire. When measured a few years ago it was 70 feet high and 6 feet in girth, and had been planted about 60 years.

This species may be distinguished from others by means of its large sycamore-like leaves, which are sometimes 9 inches across, and by its hairy fruits. The pendulous racemes of fruits are sometimes very conspicuous, for they are from 6 to 9 inches long, and the wings are frequently red in colour. Fertile seeds are borne on trees at Kew. *A. macrophyllum* is likely to thrive under similar conditions to the common sycamore, and as its wood is apparently quite equal in quality, there would appear to be no reason to doubt of its proving a commercial success, providing it thrives satisfactorily under forest conditions. It could be grown as a pure wood or as a mixture with beech or silver fir for a companion. Planting might be done at 4 feet apart.

XXVI.—FUNGI EXOTICI: XII.

(With Plate.)

G. Massee.

Eleven new fungi are here described from material sent to the Royal Botanic Gardens from the Malay Peninsula, Tropical Africa, Natal and Queensland. Of those described the *Puccinia* appears to be the most serious as it is a destructive disease of the Lemon grass at Entebbe, Uganda.

Agaricaceae.

Clitocybe egregia, *Massee*.

Pileus carnosus, convexo-umbilicatus, siccus, pallido-ochraceus, centro obscuriore, fibrillis fuscis centro praesertim virgatus, margine lobato primitusque involuto, 25–30 cm. latus. *Lamellae* decurrentes, subdistantes, perangustae, crassiusculae, subfurcatae, acie integra, albidae, aetate brunneo-tinctae. *Stipes* cylindricus, apice basique subincrassatus, farctus, glaber, albido-griseus, 25–35 cm. longus, 3–4 cm. crassus, basi fusiformi-radicatus. *Sporae* ellipticae, hyalinae, 8 × 5 μ. *Caro* firma, pallida.

Singapore. On the ground, *Ridley*, 89.

The genus *Clitocybe* includes some of the largest known agarics, but the present species far exceeds in size those previously described. *C. egregia* is most nearly allied to *C. maxima*, the latter being distinguished by the deeply infundibuliform, glabrous pileus, much shorter stem, paler colour and smaller spores.

Ustilaginaceae.

Ustilago trichopterygis, *Massee*. (Figs. 15–17.)

Sori olivaceo-atri, compacti, dein pulverulenti, ovarium implectentes. *Sporae* ellipsoideae vel globosae, episporio levissimo, fuligineo-olivaceae, $4{\cdot}5 \times 3{\cdot}5\mu$ vel $3{\cdot}5$—$4{\cdot}5\mu$ diametro.

Tropical Africa. N. Nigeria: Lokoja, in ovaries of *Trichopteryx hordeiformis*, Stapf. *J. M. Dalziel*, 276.

Resembling *Ustilago olivacea*, Tul., in habit and in general appearance, but distinguished by the much smaller, smooth spores.

Ustilago virens, *Cooke*.

Sumatra. Indragiri: on rice, *Ridley*, 11,252. Coll. *C. Curtis*.

Ustilago polytriadis, *Massee*.

Sori ovaria tantum implectentes ac ea globose turgentes, friabiles, cito pulverulenti, aterrimi. *Sporae* globosae vel mutua pressione obtuse angulatae, 15–16μ diam., atro-fuligineae, opacae, leves vel vix subrugulosae.

Malay Peninsula. Malacca: in the ovaries of *Polytrias praemorsa*, Hack.

Resembling *Ustilago australis*, Cooke, in general appearance, and habit, but differing in the larger and darker coloured spores.

Ustilago vastatoria, *Massee*.

Sori bases pedunculorum folia vaginasque nondum evolutas infestantes, eaque saepe majuscule distendentes, primo epidermide tenui tecti, dein nudi ac pulverulenti, fusco-atri. *Sporae* subglobosae, intense subopace fuligineae, episporio minutissime denseque papilloso, 15–17μ diam.

Tropical Africa. Baghirmi, N., between Massema and Abongher, on *Panicum* sp., *Chevalier*, 9638.

Somewhat resembling *Ustilago hypodytes*, Fr., in habit, but distinguished by the much larger spores.

Uredinaceae.

Puccinia cymbopogonis, *Massee*.

Maculae epiphyllae, rubescentes vel fulvescentes, indeterminatae. *Acervuli* hypophylli, minuti, lineares, erumpentes, superficiales, pulverulenti, saepius densissime gregarii et totum folium occupantes, cinnamomei. *Uredosporae* sphaeroideae vel ovatae, episporio incrassato minutissime striatulo intense cinnamomeo, 20–23μ diametro. *Teleutosporae* ovatae, medio constricto-1-septatae, episporio tenui apice valde incrassato brunneo, 30–36×20–22μ, pedicello hyalino apice fuscescente suffultae.

Tropical Africa. Uganda: Entebbe, on *Cymbopogon citratus*, Stapf. *R. Fyffe*.

This appears to be a very destructive parasite. The Lemon grass was taken from a plot in the Botanic Gardens, Entebbe, and practically every leaf was destroyed.

Puccinia pulvinata, *Massee*.

Maculae nullae. *Acervuli* hypophylli vel amphigeni, concentrice vel areolatim in centro densius dispositi, pulvinato-prominuli, compacti, intense cinnamomei dein grisei et subpulverulenti,

0·5 mm. diametro. *Teleutosporae* late ellipsoideae, subinde subglobosae, medio subconstricto-1-septatae, episporio tenui apice incrassatulo, pallide melleae, 50 × 35μ, pedicello longiusculo hyalino vel pallidissime fuscescente suffultae.

Natal. Tabamhlope, 1520 m., on leaves of *Osyridocarpus natalensis*, DC. *Wood*, 10,527.

This fungus occurred on the leaves of the specimen bearing *Aecidium osyridocarpi*, Mass., but there is no evidence to show that the two are forms of the life-cycle of one species.

The spores of the *Puccinia* germinate in situ, the numerous germ-tubes giving a hoary and slightly pulverulent appearance to the acervuli or sori. The secondary spores are broadly elliptical and measure 12–14 × 9μ.

Aecidium osyridocarpi, *Massee*. (Figs. 11–14.)

Pseudoperidia densissime gregaria, late ramulis foliisque distortis ac contorto-gyrosis insidentia, erumpentia, cylindracea, ore lacero-fimbriato albido, contextu cellulis elongato-hexagonis crasse tunicatis. *Sporae* globosae vel e mutua pressione angulosae; episporio tenui minutissime verruculoso hyalino protoplasmate aureo-flavescente repletae, 18–20μ diam.

Natal. Tabamhlope, 1520 m., on branches and leaves of *Osyridocarpus natalensis*, DC. *Wood*, 10,527.

Pseudoperidia densely crowded, causing much contortion of the shoots and leaves attacked, and in this respect closely resembling *Aecidium ornamentale*, Kalchbr., met with on *Acacia horrida*, Willd., at the Cape.

Sphaeriaceae.

Balansia sessilis, *Massee*. (Figs. 8–10.)

Stromata sessilia, globulosa, subtus plus minus angustata, dura, extus atra ac minutissime punctulata, intus albida, 1·5–2·5 mm. diam. *Perithecia* in stromatis capitulis peripherica, densissime constipata, oblongo-ovata. *Asci* cylindracei, tunica ad apicem rotundata valde incrassata, 200–220 × 10–12μ, basi leniter attenuati, aparaphysati. *Spores* filiformes, paene longitudine ascorum, hyalinae, multiguttulatae dein multiseptatae.

Malay Peninsula. Johor: Batu Pahat, on the inflorescence of a species of *Ichnanthus*. *Ridley*, 10,988.

Most closely allied to *Balansia trinitensis*, Cooke and Massee; differing in the absence of a concave *Ephelis*, or conidial condition, in the sessile stromata, and in the longer asci and spores. The inflorescence is evidently attacked by the fungus while yet enclosed in the sheath, as the branches of the normally much branched and widely spreading inflorescence, are all bound together by a general stroma, and the inflorescence emerges as a simple spike. All the species are parasitic on grasses. The genus has a wide geographical range, extending from S. America, through Africa, to New Pomerania.

Balansia asperata, *Massee*. (Figs. 1–7).

Stromata stipitata, hemisphaerica vel subglobosa, infra umbilicata, asperata, extus atra, 1 mm. diam. *Stipes* cylindricus, ligneo-carnosulus, duriusculus, extus ater, sub lente minuteque squamulosus, circa 2 mm. longus. *Perithecia* in stromatis capitulis

peripherica, densissime constipata. *Asci* cylindracei, 100–120 × 7–8μ, basi attenuati. *Sporae* filiformes, longitudine ascorum, hyalinae, multiseptatae.

Malay Peninsula. Johor: Mount Austin, on the inflorescence of *Ichnanthus pallens*, Munro. *Ridley*, 12,508.

In this species the ovary of the host is converted into a black sclerotium, which produces a single, stipitate, ascigerous stroma. Allied to *Balansia Jungueri*, P. Henn., but much smaller in every part.

Gibbera tinctoria, *Massee*.

Perithecia epiphylla, densissime aggregato-constipata, crustam atram superficiem foliorum obtegentem efficicientia, globosa, purpureo-atra, rugulosa, ostiolo papillulato donata, 0·5 mm. diam., contextu minutissime parenchymatico sordide purpureo. *Asci* cylindraceo-clavati, apice crassiuscule tunicati, basi attenuato-pedicellati, 80 × 7–8μ. *Sporae* oblique distichae, ellipsoideae, utrinque rotundato-truncatae, 1–septatae, dilutissime flavae, 11–12 × 5–6μ.

Tropical Africa. Rhodesia: on leaves of *Monotes glaber*, Sprague. *Allen*, 734.

This species was first detected by my colleague, Mr. T. A. Sprague, B.Sc., on phanerogamic material sent to Kew for determination. Differs from *Gibbera Vaccinii*, Fr., in the much smaller, and relatively narrower spores, and in the dingy purple colour of the tissue of the perithecium. When treated with a dilute solution of potassic hydrate a brilliant purple colouring matter is liberated.

Hyphomycetes.

Hainesia aurantiaca, *Massee*.

Acervuli subcutanei, sparsi, vix pulvinati, parvuli, 0·5–1 mm. diametro, saepe confluentes, laete aurantiaci, dein pallescentes. *Sporulae* ellipticae, utrinque latissime rotundatae, hyalinae, saepe curvulae, 10–12 × 3–3·5μ, in sterigmatibus e strato prolifero fusco exsurgentibus filiformes, hyalinae, solitariae, acrogenae.

Queensland. On the pericarp of *Endiandra insignis*, Bailey.

Distinguished from its nearest ally, *Hainesia rhoina*, Ell. and Sacc., by its clear orange colour and somewhat larger sporules.

Explanation of Figures.

Figs. 1–7. — *Balansia asperata.*
Figs. 8–10. — *Balansia sessilis.*
Figs. 11–14.—*Aecidium osyridocarpi.*
Figs. 15–17.—*Ustilago trichopterygis.*

XXVII.—THE RAISED TURF SYSTEM OF PLANTING BOG-LAND.

(With Plates.)

W. Dallimore.

The successful planting of wet, boggy land is one of the most difficult problems the forester has to deal with, and when such conditions prevail at a high elevation and an unsatisfactory climate has also to be considered, the planter finds full scope for his abilities.

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In the past the great difficulty has been the proper draining and aerating of the ground at such a cost as would bring the work within the limits of practical commercial forestry, for, although in many cases proper draining would have been quite practicable, the cost was prohibitive. On the other hand, the opening of surface drains 15 to 20 feet apart, which could be done at a small cost, had little effect in districts where the rainfall was heavy, consequently the ground never became suitable for tree growth. A certain amount of success has attended ridging, especially where the ground has not been very wet to begin with, but this method of planting is not applicable to all circumstances.

For some years past a system of planting bog-land has obtained in Belgium which, though really an old system revived, has come to be known as the "Belgian system" or "raised turf system" of planting. This consists of opening drains 6 or 8 feet apart and 12 to 18 inches deep. The turves obtained during the process are laid face downwards at distances of 3 or 4 feet apart, the distance being regulated by the spacing of the trees. The turves are allowed to dry for several months, sometimes a year, during which time they become well aired and sweet. At planting time—April or May are considered the best months for the work—a circular hole is made in each turf. The soil removed is mixed with a handful or two of sharp sand and sometimes with a little basic slag, and placed around the roots of the young tree as it is being planted. Trees from two to three years old are found to be most satisfactory for the purpose.

About 1906 or 1907 this method of planting claimed the attention of Sir John Stirling Maxwell, Bart., one of the greatest enthusiasts in forestry matters in Scotland, who for 10 years or so had been experimenting with the planting of bog-land on his Inverness-shire estate at Fersit and Corrour, at altitudes varying between 800 and 1400 feet. At the higher elevations and under the worst conditions his experiments had met with little success, and he was convinced that the usually adopted measures could end in nothing but failure. Seeing that the "Belgian system" had much in its favour he decided to give it a good trial and described the method of culture in the "Transactions of the Royal Scottish Arboricultural Society," vol. xx, pp. 1–7. After a trial of three years the results were circulated through the medium of the same publication in 1910, vol. xxiii, pp. 153–157. The results as published there give overwhelming evidence of the superiority of this method of culture over those already tried, while details of cost show that it is well within the bounds of practical forestry. A description of the experiments from notes made during a visit to the experimental area last June may also be found in the *Kew Bulletin*, 1910, pp. 242–243.

The kindness of Sir John Stirling Maxwell in presenting specimens of young trees grown under both old and new systems of culture, for the Forestry Museum at Kew, has been the means of obtaining the accompanying photographs. The following explanatory remarks about the plants figured have been furnished by Mr. D. Grant, forester to Sir John at Fersit :—

"No. 1. Sitka spruce raised in Pollok seed beds, and lined one year in Fersit nursery. Planted on turf (Belgian system) age

1.

2.

5.

6.

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3. 4.

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XXVIII.—DIAGNOSES AFRICANAE: XLII.

1261. **Heteromorpha scandens**, *J. J. Clark* [Umbelliferae]; affinis *H. arborescenti*, Cham. et Schlecht., sed caule scandente, foliis biternatis et margine crenato-dentatis, calycis dentibus nullis, fructu immaturo leviter alato differt.

Herba scandens, glabra, ramis tenuibus interdum tortis leviter multi-costatis. *Folia* alterna, biternata, petiolis 2·5–5·5 cm. longis, petiolulis primi ordinis 1·4–2·2 cm. longis, secundi ordinis 2–4 mm. longis; foliola membranacea, ovata, breviter acuminata, basi rotundata, margine crenato-dentata dentibus setuloso-mucronatis, 2·2–4·2 cm. longa, 1·3–2·2 cm. lata, nervis lateralibus 5–9. *Umbellae* compositae, terminales et axillares; involucri bracteae oblongae, ciliolatae, apice rotundatae, ∞, circa 5 mm. longae; involucellorum similes sed minores et non ciliolatae; pedunculi 2–3·5 longi, pedicelli 8 mm. longi. *Calycis* dentes 0. *Petala* ovata, integra, apice inflexa. *Discus* margine undulato cum stylopodiis conicis confluens. *Antherae* versatiles, flavae, 0·4 mm. longae; filamenta tenuia, 1·5 cm. longa; styli demum reflexi, brevissimi. *Fructus* immaturus oblongus, laevis, a latere compressus, semimaturus leviter alatus, plerumque uno mericárpio inhibito, altero plus minusve falcato, jugis primariis prominentibus, vittis ad valleculas solitariis 6.

Tropical Africa. British East Africa: Aberdare mountains, 2286 m., *Battiscombe*, 278.

1262. **Acalypha Allenii**, *Hutchinson* [Euphorbiaceae-Crotoneae]; affinis *A. ornatae*, Hochst., sed foliis ovato-vel oblongo-lanceolatis, caulibus pilis glandulis numerosis ornatis differt.

Planta herbacea, parva; caules circiter 30 cm. longi, profunde sulcati, glandulis stipitatis numerosis obtecti. *Folia* ovato-lanceolata vel oblongo-lanceolata, apice mucronata, basi cordata, 4–9 cm. longa, 1·2–4·5 cm. lata, repando-dentata vel denticulata, paullo rigide chartacea, utrinque setosa, nervis lateralibus utrinque 6–8 inferioribus ascendentibus superioribus arcuatis utrinque prominentibus, nervis tertiariis parallelis crebris subtus distinctis; petioli 0·5–1·2 cm. longi, glanduloso-pubescentes; stipulae lineari-subulatae, 6 mm. longae, parce pilosae. *Flores* monoici. *Racemi* ♂ axillares, solitarii, circiter 6 cm. longi; axis parce glanduloso-pubescens; bracteae conspicuae, lineares, 3 mm. longae, stipitato-glanduligerae. *Spicae* ♀ terminales, 5–7·5 cm. longae; bracteae ad 1·2 cm. longae, multidentatae, breviter acuminatae, dentibus glandulis stipitatis ornatis. *Sepala* 3, ovata, glanduloso-ciliata. *Ovarium* profunde trilobum, pilosum, eglandulosum; styli laciniati vel pectinati, dorso pilosi. *Capsula* non visa.

Tropical Africa. Rhodesia: Gwaai forest, *Allen*, 238; Leshumo Valley, *Holub*. Wankie Line, 80 miles north of Bulawayo, on sandstone, *Eyles*, 1130; 'South African gold-fields,' *Baines*.

1263. **Acalypha glomerata**, *Hutchinson* [Euphorbiaceae - Crotoneae]; *A. crenatae*, Hochst., similis, inflorescentiis ad apices ramorum confertis, bracteis ♀ glandulis stipitatis numerosis ornatis differt.

Herba gracilis, erecta, ramosa; caulis basim versus interdum lignosus, subteres, sulcatus, pilis brevibus pubescens, stipitato-glanduligera. *Folia* ovato-elliptica vel rhomboideo-elliptica, apice obtusa vel subacuta, basi cuneata, 2·5–6·5 cm. longa, 0·5–4 cm. lata, crenata, membranacea, utrinque setuloso-pubescentia, e basi 5-nervia, nervis lateralibus utrinque 3–4 prominentibus, nervis tertiariis laxis plus minusve parallelis subtus distinctis; petioli foliis aequilongi vel longiores, pubescentes; stipulae subulatae, parvae, pilosae. *Flores* monoici. *Inflorescentiae* ad ramorum apices glomeratae. *Bracteae* ♀ glomeratae, foliaceae, suborbiculares vel fere reniformes, circiter 3 mm. longae et 4 mm. latae, 8–10-dentatae, dentibus triangularibus intra marginem pilis longis apice glandulis ornatis, extus pubescentes, intus fere glabrae. *Sepala* 3, ovato-lanceolata, acuta, ciliata. *Ovarium* trilobatum, superne setoso-pubescens pilis glanduligeris intermixtis; styli gracillimi, paullo breves, fere basi divisi. *Semina* ovoideo-ellipsoidea, minute punctata, vix 2 mm. longa. *A. crenata*, var. *glandulosa*, Muell.-Arg. in Linnaea xxxiv. 42, et in DC. Prodr. xv. 871; *A. fimbriata*, Baill. Adansonia i. 272, partim, non Schumach. nec Hochst. (ex Müller).

Tropical Africa. Bongo: Addai, *Schweinfurth*, 2522; Gir, *Schweinfurth*, 2609. Uganda: Muka, *Kaessner*, 929. Galunka, *Kaessner*, 791; without precise locality, *Stuhlmann*, 1251, 1258. Zanzibar, *Schlechter; Stuhlmann*, 421, 423. German East Africa: Usaramo, *Stuhlmann*, 6599, 7005, 8674; Mrogoro, *Stuhlmann*, 8285; Marangu, *Volkens*, 2316; Dar-es-Salam, *Stuhlmann*, 7007, 7410, 7415, 7824, 7562; Tanga, *Holst*, 2022; *Volkens*, 166; Amboni, *Holst*, 2746. Portuguese East Africa: Mozambique, *Kuntze*.

1264. **Acalypha Grantii**, *Baker et Hutchinson* [Euphorbiaceae-Crotoneae]; affinis *A. ornatae*, Hochst. ex A. Rich., foliis glabris et floribus dioicis differt.

Frutex circiter 2 m. altus; rami juniores brevissime pubescentes, demum glabri. *Folia* ovata, apice sensim vel caudato-acuminata, acumine integro, basi rotundata vel subcordata, 5–6·5 cm. longa, 2–4·5 cm. lata, obtuse serrata, subchartacea vel fere membranacea, utrinque glabra, basi digitatim 5-nervia, nervis lateralibus utrinque 4–5 subtus prominentibus; petioli graciles, 1·3–3 cm. longi, supra in sulcis pubescentes, caeterum glabri; stipulae lineares, mox deciduae. *Flores* dioici?, ♂ non visi. *Spicae* ♀ terminales, circiter 2 cm. longae. *Bracteae* parvae, acuminatae, minute dentatae, dentibus glandulis terminatis, extus pubescentes. *Sepala* 3, ovata, superne ciliata. *Ovarium* superne pilosum, eglandulosum; styli 3, crassi, purpurei, profunde laciniati, glabri. *Capsula* et *semina* non visa.

Tropical Africa. Bongo: Sabbi, *Schweinfurth*, 2201. Uganda: Madi, *Speke* and *Grant*.

Both specimens are young and somewhat imperfect, and it is therefore uncertain whether the flowers are really dioecious.

1265. **Acalypha paucifolia**, *Baker et Hutchinson* [Euphorbiaceae-Crotoneae]; affinis *A. villicauli*, Hochst., sed bracteis florum ♀ acuminatis, foliis linearibus vel lineari-lanceolatis differt.

Caules probabiliter e rhizomate orti, graciles, usque ad 17 cm. longi, compressi vel sulcati, juniores longe setosi et breviter pubescentes, demum glabri. *Folia* lanceolata vel lineari-lanceolata, apice subacuta, basi rotundata, 2·5–5·5 cm. longa, 4–10 mm. lata, paullo repando-dentata, tenuiter chartacea, utrinque glabra costa et nervis lateralibus setosis exceptis, nervis lateralibus utrinque 10 arcuatis subtus distinctis, venis laxis; petioli 8–12 mm. longi, saepius setosi vel puberuli; stipulae lineari-subulatae, 4–7 mm. longae, fere glabrae. *Flores* monoici. *Inflorescentiae* ♂ solitariae, axillares, pedunculatae, 4–8 cm. longae; axis sulcatus, pubescens. *Gemmae* ♂ glabrae. *Spicae* ♀ terminales, 2·5–4 cm. longae; bracteae parvae, late ovatae, caudato-acuminatae, circiter 10-dentatae, dentibus dense stipitato-glandulosis. *Sepala* 3, lanceolata, ciliata. *Ovarium* parvum, parce pubescens, glandulosum; styli crassi, 4–5 mm. longi, laciniati, glabri. *Capsule* et *semina* non visa.

Tropical Africa. Portuguese East Africa: near Lake Nyasa, *W. P. Johnson*, 457.

1266. **Acalypha subsessilis**, *Hutchinson* [Euphorbiaceae - Crotoneae]; affinis *A. neptunicae*, Muell.-Arg., foliis subsessilibus, inflorescentiis brevioribus, bracteis ♀ minoribus inconspicuis differt.

Frutex; rami subteretes, cortice glabro paullo rugoso; ramuli juniores puberuli. *Folia* subsessilia, oblanceolata vel obovata, basi cuneata, apice obtuse acuminata, acumine interdum emarginato, 4–9 cm. longa, 2–5 cm. lata, chartacea, obtuse serrata, utrinque glabra, nervis lateralibus utrinque 6–7 intra marginem anastomosantibus subtus valde prominentibus, nervis tertiariis laxis subparallelis subtus conspicuis; stipulae lineari-lanceolatae, dorso carinatae, squamiformes, leviter pubescentes vel glabrae, 5 mm. longae. *Flores* monoici. *Inflorescentiae* 2·5 cm. longae, basi floribus foeminis 1 vel 2, superne floribus masculis numerosis; axis dense pubescens. *Gemmae* ♂ leviter pubescentes vel fere glabrae. *Bracteae* ♀ parvae et inconspicuae. *Sepala* 3, ciliata. *Ovarium* setosum; styli laciniati. *Capsula* et *semina* non visa.—*Mallotus brevipes*, Pax ex Engl. Pfl. Ost-Afr. vol. A. p. 18, nomen (non *Acalypha brevipes*, Muell.-Arg.).

Tropical Africa. British East Africa: Mazeras, *Powell*, 3 (partim). German East Africa: Usambara; Maschena, *Holst*, 3568. Tanga, *Volkens*, 185.

Var. **mollis**, *Hutchinson*; a typo ramis et foliis subtus molliter et dense pubescentibus differt.

Tropical Africa. British East Africa: Mazeras, *Powell*, 3 (partim); Zanzibar, *Kirk*.

1267. **Cyrtogonone**, *Prain*, gen. nov. [Euphorbiaceae-Crotoneae] genus inter Chrozophoreas prope *Sumbaviam* forsan melius ponendum; a *Crotonogyne* Chrozophorearum, quacum adhuc ob indumentum lepidotum consociatum, floribus paniculatis staminum indole petalisque liberis aliquanto distat.

Flores dioici, dichlamydei. ♂ *Calyx* in alabastro globosus, clausus, per anthesin irregulariter 2–3-valvus. *Petala* 5, raro 6, contorto-imbricata, libera. *Stamina* numerosa receptaculo parum convexo affixa; filamenta libera glandulis receptacularibus totidem consociata, summo apice inflexa, antheris fere triplo longiora, glabra;

antherae jam in alabastro erectae, dorsifixae, locelli paralleli connectivo latiusculo adnati, introrsim spectantes, longitudinaliter dehiscentes. *Glandulae receptaculares* antheras sessiles cassas simulantes dorso prope basin carinatae, antice supra medium stellato-hirsutae, apice minutissime emarginatae. *Ovarii rudimentum* 0. *Flores feminei* ignoti.—*Arbor* mediocris. *Folia* subtus densissime lepidota, alterna, ampla, penninervia, petiolo elongato, limbo basi 2-glanduloso ; stipulae minutae. *Flores* cymosi ; cymae in paniculam amplam terminalem dispositae ; bracteae minutae. *Inflorescentia* tota dense lepidota.

C. argentea, *Prain* (species unica).

Arbor dioica 8–12 m. alta, ramulis densissime lepidotis. *Folia* longa petiolota, coriacea, elliptica vel obovato-oblonga, abrupte acuminata, basi late cuneata vel rotundata, margine integra vel casu apicem versus denticulata vel minute acute lobulata, 15–25 cm. longa, 7–13 cm. lata; supra glabra, opaca, atrorividia ad basin ipsam distincte 2-glandulosa ; subtus densissime lepidota, argentea, nitidula ; petiolus 6–10 cm. longus, dense lepidotus apice basique simul incrassatus ; stipulae minutae, lepidotae. *Panicula* ubique lepidota, 25–30 cm. usque longa, basi 10 cm. diametro ; rhachis ramulos 15–20, inter se 0·5–1·5 cm. remotos 3–7 cm. longos emittens ; ramuli cymas 3–7 suffulcientes ; cymae 3–7-florae pedunculis 3–5 mm. longis ; bracteae ovatae, lanceolatae, 1–1·5 mm. longae ; pedicelli 4–5 cm. longi. *Calyx* in alabastro globosus, 6–8 mm. latus, clausus dein 2–3-fissus, densissime lepidotus. *Petala* 5, raro 6, contorto-imbricata, primum omnino extra, ultimum omnino intus, orbicularia, glabra, albida. *Stamina* 27–30 ; filamenta glabra, libera, 3 mm. longa ; antherae 1 mm. longae locellis connectivo latiusculo affixis, introrsim spectantes ; glandulae receptaculi omnes juxtastaminales. *Ovarii rudimentum* 0.—*Crotonogyne argentea*, Pax in Engl. Bot. Jahrb. xxxiii, 283.

Tropical Africa. Upper Guinea : Cameroons ; Bipindi district, Mimfia, *Zenker* 2029, 2359, 3078, 3668.

Dr. Pax has already fully explained the difficulties involved in referring this plant to the genus *Crotonogyne*, with which it agrees in having lepidote scales and two glands on the upper surface of the leaf at the junction of blade and petiole, but from which it differs in having a terminal not lateral inflorescence, in having free in place of united male petals, and in having inter-staminal receptacular glands as well as an extra-staminal ring, alternate with the filaments of the outer series. In general facies the plant now described much resembles *Sumbavia macrophylla*, Muell.-Arg., but differs in having the leaves with a pair of basal glands and not at all peltate at the base, in having lepidote scales in place of stellate hairs, in having relatively larger petals, much stouter filaments, introrse in place of lateral anther-cells, and in having glands on the receptacle. The receptacle in *Sumbavia* is densely pubescent, but has no glands.

1268. **Macaranga Dawei,** *Prain* [Euphorbiaceae-Crotoneae] ; species nulli africanae arcte affinis, filamentis basi connatis apice irregulariter et quasi ramosim solutis insignis.

Arbor parva ; ramulis puberulis. *Folia* breve petiolata, chartacea, lanceolata vel oblongo-lanceolata, acuta, basi late cuneata vel

rotundata, margine breviter sed distincte irregulariter dentata raro subintegra, 6–10 cm. longa, 1·5–2·5 cm. lata, supra glabra intense viridia, subtus glanduloso-lepidota ; petiolus 0·5–0·8 cm. longus, puberulus ; stipulae lanceolatae, 0·4–0·6 cm. longae, puberulae, caducae. *Flores masculi* in spicas breves laterales aggregati ; spicae 0·6–1·2 cm. longae ; bracteae parvae, ovatae, acutae, integrae, pluriflorae. *Calyx* in alabastro globosus, minutus, pubescens. *Stamina* 5–12 ; filamenta basi connata, apice libera, nonnunquam irregulariter, columnam filamentis ramosis simulantem efficientia. *Flores feminei* et *fructus* ignoti.

Tropical Africa. Nileland. Uganda : Western Prov. ; Mubuka River on the lower slopes of Ruwenzori, *Dawe* 595.

1269. **Gelonium angolense,** *Prain* [Euphorbiaceae-Crotoneae] ; species *G. zanzibarensi*, Muell Arg., similior, sed calyce femineo 3-lobo lobis eglandulosis, endocarpio coriaceo nec crustaceo aliisque notis facillime sejungenda.

Frutex dioicus, glaberrimus. *Folia* breve petiolata, subcoriacea, obovato-oblonga, breve cuspidata, basi cuneata, margine integra, 7·5–12·5 cm. longa, 3–6 cm. lata, supra opaca ; nervi laterales utrinsecus 6–8, indistincte prope marginem anastomosantes, reticulatio vix manifesta, nequaquam vesiculoso-punctata ; petioli 1 cm. longi. *Flores masculi* adhuc ignoti ; *feminei* in cymulas breve pedunculatas foliis oppositas aggregati. *Sepala* 3, eglandulosa, aequalia, ovata, margine ciliolata. *Discus* cupularis 3-lobus lobis sepalis alternantibus margine inter lobos staminodiorum rudimenta gerens. *Ovarium* 3-lobulare, glabrum ; styli lati, complanati, apice emarginati, patentes et carpidiis applicati. *Fructus* indistincte 3-sulcatus et parum 3-carinatus, minute apiculatus, 8 mm. latus, tardius loculicide simulque septicide in valvulas 6 secedens ; endocarpio crasse coriaceo. *Semina* ovoidea, arillo pulposo munita ; testa crustacea, foveolato-reticulata.

Tropical Africa. Lower Guinea : Angola ; Cazengo, *Gossweiler*.

A very distinct species easily separable from those hitherto described by the 3-merous female calyx.

1270. **Gelonium procerum,** *Prain* [Euphorbiaceae-Crotoneae] ; species affinis *G. africanae*, Muell.-Arg., a qua differt ramulis semper alternatim nec superne opposite foliosis, staminibus numerosioribus, foliis omnino integris.

Arbor procera, dioica, glaberrima, ramulis parum angulatis, ramorum cortice fisso, ligno albo duro. *Folia* breve petiolata, subcoriacea, ovata, subacuta obtusave, basi cuneata, margine integra, 3–7·5 cm. longa, 2–4 cm. lata, supra nitida ; nervi laterales utrinsecus 4–6 ; reticulatio creberrima distincta ; utrinque sed praesertim subtus distincte dense vesiculoso-punctata ; petioli 4–5 mm. longi. *Flores masculi* in cymulas subsessiles oppositifolias aggregati : alabastra globosa. *Sepala* 5 valde inaequalia, 3 (exteriora cum intima) suborbicularia ; cetera oblonga, obtusa, duplo breviora ; omnia margine ciliata, dorso eglandulosa. *Stamina* 20. *Flores feminei* et *capsula* adhuc ignota.

Tropical Africa. British East Africa : Ukamba ; south of Nairobi, *Elliott* 178.

XXIX.—PERSIMMONS.

(*Diospyros Kaki*, Linn. f. and *D. Roxburghii*, Carrière.)

W. Botting Hemsley.

In the Botanical Magazine for April, 1907 (t. 8127) a coloured figure, together with a description, is given of one of the numerous varieties of *Diospyros Kaki*, Linn. f., a species which is generally considered to include the 'Schitze' of the Chinese and the 'Kaki' of the Japanese. Much of interest relating to this fruit had to be left out of the Botanical Magazine, and it was announced there that a fuller account of it would follow in the *Kew Bulletin*. Pressure of other work has hitherto prevented this from being carried into effect, and even now it is more a guide to the literature of the subject that is offered here than a review or epitome of the same. Fortunately further investigations have led to the discovery of an error of some importance in the usually accepted synonymy of *Diospyros Kaki*, Linn. f. Concerning this point a somewhat heated controversy was carried on upwards of forty years ago. The chief disputants were Professor J. Decaisne, of the Jardin des Plantes of Paris, and Mr. E. A. Carrière, also of that establishment and the critical editor of the Revue Horticole. Briefly stated, Decaisne challenged the validity of certain species proposed and described by Carrière and he also asserted that Carrière had confused and interchanged the names of previously described species. Decaisne's views were widely accepted, and, to a great extent, have prevailed up to the present time. He maintained that *D. Kaki*, Linn. f. and *D. Schitze*, Bunge, were distinct species; that the species described by Carrière as *D. Roxburghii* was the true *D. Kaki*; and that the species recognised by Carrière as *D. Kaki* was in reality *D. Schitze*. Fortunately Decaisne backed his opinion by dried specimens, named in his own handwriting; a set of which he sent to Kew. Whether *D. Schitze*, Bunge, founded on specimens from the neighbourhood of Peking, is the same as *D. Kaki*, is, perhaps, not beyond doubt; and there is yet much to be done with the numerous specimens in herbaria from China and Japan named *D. Lotus*, Linn., before this point can be definitely settled.

The error referred to above in the synonymy of *D. Kaki* is the inclusion of *D. Roxburghii*, Carr., initiated by Decaisne and accepted by most subsequent writers. After the publication of the plate cited in the Botanical Magazine I examined more carefully the Indian specimens referred to *D. Kaki*, and came to the conclusion that they were specifically different, and further comparisons led to their identification with cultivated specimens and the figures of *D. Roxburghii*, Carr.

References are given in the Bibliography below to the publications in which appeared Decaisne and Carrière's discussion of the species question. Charles Naudin, who was an authority in the botany of many cultivated plants, also took up the subject. He defined what he regarded as *D. Lotus*, Linn., *D. chinensis*, Blume, and *D. Schitze*, Bunge, and he described *D. Psendo-Lotus* and

D. Kaempferi as new species. Not having access to Naudin's types at the present time I have not attempted a collation of the whole of his species.

The most important of the results of my investigations are the specific differences and native countries of *D. Kaki* and *D. Roxburghii*. *D. Kaki* is apparently confined to Central and Eastern China and Japan, whereas *D. Roxburghii* is a native of Eastern India and Western China. Whether *D. Roxburghii* is concerned in the parentage of any of the cultivated, edible persimmons is uncertain. I have found no reliable data. Clarke states that the natives of the Naga Hills "can eat the fruit." No other collector refers to *D. Roxburghii* as having an edible fruit; yet nearly all the specimens are named *D. Kaki*. These species are readily distinguished by their foliage as described below.

Diospyros Kaki, *Linn. f.*; inter species sino-japonicas floribus magnis ob folia tenuia saepius lata ampla facile distinguitur.

China. Flora Pekinensis: without locality, *Bretschneider*, 487, 489; without locality, *Everard*, comm. Rev. T. Preston; without locality, *Thunberg* in British Museum Herbarium; *D. Kaki* and *D. Lotus*, intermixed. Drawing of the same at Kew.

Japan. Yokoham, culta et sponte, *Maximowicz*, 1862; without locality, *C. Wright*; Nagasaki, wild and cultivated, *R. Oldham*, 528, 638; Tsu-sima Islands, Straits of Corea, *C. Wilford*, 756.

Cultivated in India. In the Raja's Garden at Panukka, Bhotan, *W. Griffith*, in British Museum Herbarium. Drawing of the same at Kew.

Cultivated in Europe. There are two specimens at Kew from the Paris Herbarium, cultivated in the Jardin des Plantes, and labelled in the handwriting of J. Decaisne, namely: *D. Schitze* Bunge, certissime, cum specim. Bungeanam comparate, H. Par. 1875, communicated by Prof. Dyer the same year, and *D. Schitze*, Bunge [syn.] *D. Kaki*, Carr. Rev. Hort. 1869; *D. costata*, Carr. H. Par. seminar. 1870; received direct from Decaisne, Novr., 1870. Hort. Kew, 1906, the specimen figured in the Botanical Magazine, t. 8127.

Besides the foregoing specimens, which undoubtedly belong to *D. Kaki*, there are others at Kew, collected in Central China by A. Henry and referred by me (Journ. Linn. Soc. xxvi. p. 69) to *D. Kaki*, which are not typical *D. Kaki* and possibly not the same species. These are numbered 1560, 1962, 3567 and 3861; and, in a note to 1962 and 3861, Henry states that they are the Yu-shih-tzu, or oil Persimmon, of the Chinese.

Synonymy and Coloured Figures of Named Varieties of Diospyros Kaki, Linn. f., Supplement, 1781, p. 439.

Diospyros Aurantium, *André* in Rev. Hort. 1887, p. 348, with a coloured figure.

Diospyros Bertii, *André* loc. cit., with a coloured figure.

Diospyros chinensis, *Blume*, Cat. Pl. Hort. Buitenz. 1823, p. 110, and Bijdr. Fl. Ned. Ind. 1825, p. 670, where he reduces it to *D. Kaki*; Naud. in Nouv. Arch. du Mus. d'Hist. Nat. Par. ser. 2, vol. iii, 1880, p. 221 (by error *sinensis*) t. 9, and in Bull. Soc. d'Acclim. de France, 1881, ser. 3, vol. viii, pp. 397–400.

Diospyros costata, *Carr.* in Rev. Hort. 1869, p. 284, and 1870, pp. 131 and 410, with a coloured figure.

Diospyros elliptica, *André* in Rev. Hort, 1887, p. 348, with a coloured figure.

Diospyros Kaempferi, *Naud.* in Nouv. Arch. du Mus. d'Hist. Nat. Par. ser. 2, vol. iii, 1880, p. 226, t. 10.

Diospyros Kaki, var. **costata,** *André* in L'Illustr. Hort. 1871, vol. xviii, p. 176, t. 78; W. P. H. in Gard. Chron. 1872, p. 576, f. 152, and op. cit. 1875, vol. ix, p. 777, f. 158; Report of the Secretary of Agriculture, U.S.A., for 1892, p. 265, t. 11.

Diospyros Lycopersicon, *Carr.* in Rev. Hort. 1878, p. 470, with a coloured figure.

Diospyros Mazelii, *Carr.* op. cit. 1874, p. 70, with a coloured figure; Naud. under *D. Schitze*, in Nouv. Arch. du Mus. d'Hist. Nat. Par. ser. 2, vol. iii, 1880, p. 222.

Diospyros Sahuti, *André* in Rev. Hort. 1887, p. 348, with a coloured figure.

Diospyros Schitze, *Bunge*, Enum. Pl. Chin. Bor. 1834, p. 42; Naud. in Nouv. Arch. du Mus. d'Hist. Nat. Par. ser. 2, vol. iii, 1880, p. 222, t. 11.

Embryopteris Kaki, *G. Don*, Gen. Syst. 1837, vol. iv, p. 41.

Ono Kaki, Kaempf. Amoen. Exot. 1712, p. 805, with a figure, p. 806.

Su-pim, Boym, Fl. Sinensis, 1656, t. M.

It may be useful to add the following references to writings on "*Diospyros Kaki*," though no attempt is made to discriminate between those dealing with the species as restricted in this paper and those in which there is a confusion of *D. Kaki* and *D. Roxburghii*.

Diospyros Kaki, *Thumb. Fl. Jap.* 1784, p. 157, excl. var. β; *Lour. Fl. Cochinch.* 1790, p. 226; *Ait. Hort. Kew*, ed. 2, 1813, vol. v, p. 478; *Roxb. Fl. Ind.* 1832, vol. ii, p. 527; *Loud. Arbor.* 1838, vol. ii, p. 1197; *Wight, Ic. Pl. Ind. Or.* 1842, vol. ii, t. 415; *DC. Prodr.* 1844, vol. viii, p. 229, excl. var. glabra; *Decne. in Gard. Chron.* 1870, p. 39; *Carr. in loc. cit.*, p. 312; *Hiern in Trans. Camb. Phil. Soc.* 1873, vol. xii, p. 227; *Franch. et Savat. Enum. Pl. Jap.* 1875, vol. i, p. 306; *Dupont in Rev. Hort.* 1880, p. 352, ff. 69–73, *et in L'Illustr. Hort.* 1880, vol. xxvii, p. 170; *Bretschn. Early Res.* 1881, pp. 5, 23, 29; *Clarke in Hook. f. Fl. Brit. Ind.* 1882, vol. iii, p. 555; *Hemsl in Journ. Linn. Soc.* 1889, vol. xxvi, p. 69; *W.W. in Gard. Chron.* 1893, vol. xiv, p. 682; *Sargent, For. Fl. Jap.* 1894, p. 50; *Useful Plants of Japan, described and illustrated* 1895, pp. 51–52, ff. 194–197; *Bretschn. Europ. Bot. Discov. in China*, 1898, p. 830; *Brandis, Indian Trees*, 1906, p. 432; *Honzo Zufu*, sine anno, fasc. lxiv, ff. 4–13.

Diospyros Roxburghii, *Carrière*; species ex affinitate *D. Kaki*, a qua differt imprimis folia crassiora fere coriacea lanceolata vel lanceolato-oblonga utrinque attenuata venis primariis prominentibus et corollae lobi latiores quam longi.—*D. Kaki* auctorum fere omnium, sed non Linn. f.

Eastern India. Assam: Khasia Hills, in various localities; *Nunklow*, 1668; *Mooshye*, 2363; Panee, without number, *Hooker and Thomson*; without locality, *G. Mann*, 186. Naga Hills, *C. B. Clarke*, 41150A.

Western China. Yunnan: Szemao, *A. Henry*, 9341, 11618A, 11618C, 11618D. Hupeh: Ichang and immediate neighbourhood, *A. Henry*, 1502.

Cultivated in Europe. H. Par. (Hortus Parisiensis), 1875; received through Prof. Dyer, viii, 1875; named *Diospyros Kaki*. *D. Roxburghii*, Carr., Herb. Mus. Par. Antibes (Alpes Maritimes) sub dio cult., 1871; named *D. Kaki*, Thunb., Herb. G. Thuret., comm. xi, 1871. All the specimens cited are in the Kew Herbarium.

One of the specimens from Antibes is in fruit; the rest of these cultivated specimens are barren shoots in a quite young condition. With the specimen named *D. Kaki*, H. Par. 1875, are male and female flowers in envelopes, labelled respectively: *Diospyros Kaki*, ♀, Hort. Thuret, and *Diospyros Kaki*, ♂, Hort. Thuret. The envelopes are inscribed as having been received at the same date as the leafy shoot on the same sheet; but they are certainly neither those of *D. Kaki* nor those of *D. Roxburghii*. Possibly they belong to *D. Lotus*, which was among the species cultivated in France at that date. This supposition is almost confirmed by the fact that there is a cultivated flowering specimen in the Kew Herbarium from the same source, received at the same time, and named *D. Kaki*, which I take to be *D. Lotus* Linn. It is labelled: Antibes, sub dio cult. 27 Mai, 1870.

Carrière states (Revue Horticole 1874, p. 71, under *D. Mazelii*) that his *D. Roxburghii* is not so hardy a tree as *D. Kaki*.

Early History of the Kaki.

Although, on the authority of Bretschneider, the Kaki is cultivated all over China, it does not figure among the vegetable products of China mentioned by Marco Polo, the pioneer of European travellers in that country, who resided there for a number of years towards the end of the thirteenth century. About the middle of the sixteenth century the first Jesuit missionaries landed in China, and it is to successive members of this order that we are indebted for our earliest knowledge of the Kaki. Bretschneider gives extracts from their writings, accompanied by comments in relation to his identifications. Ricci is the earliest (1615) cited, and he refers to a peculiar very common fruit which the Portuguese used to call Chinese Figs. Alvarus de Semedo (1643) has the following passage, as translated from the French by Bretschneider:—"There is a kind of fruit grown everywhere in China which they call *su zu* in their language. The Portuguese used to term it Red Fig. It bears, however, no resemblance to a fig, for it is of a red colour outside, contains a gold coloured pulp and seeds resembling almond kernels. Its shape is that of an orange, but it varies in size. It has the skin very soft and is of a delicious flavour. The best are grown in the colder parts of China, namely, in the provinces of

Honan, Shensi, Shansi and Shantung, especially in the last-named, where they used to dry them and send them off to the other provinces of the Empire. When dried this fruit resembles somewhat our figs, but it is superior in flavour."

Bretschneider remarks: "This is without doubt the *Diospyros Kaki*, Linn. f. (*D. Schitze*, Bunge), a very common fruit tree all over China, where a great many varieties of it are cultivated. The Chinese name of the fruit is schitze; in the Amoy dialect sutsu."

Passing over a number of writers who mention this fruit, but whose works we have not seen, we come to Boym (1656), whose Flora Sinensis is the earliest illustrated book on the natural history of China that Kew possesses, and probably the earliest extant. It is a thin quarto, printed in Latin at Vienna, and containing twenty-three plates illustrative of the flora or rather of the pomona, for they nearly all represent cultivated, edible fruits, several of which are not natives of China. The plates and letterpress are designated by the alphabet, from A onwards. *Diospyros Kaki* is rudely, though unmistakably represented by plate M, which is explained in the following terms: "Supim, Fructus Sinicus. Arbor et fructus supim apud Sinas tantum nascitur, est et aurei et purpurei coloris, magnus pomum excedit, carnem mollem et rubeam cum simili pellicula refert; ossicula hic inde interius abscondit; cum siccatur ficubus Europaeis simillimus est, et per multos annos conservatus, a Sinis Medicis saepenumero in pharmacis adhibetur. Egregius profecto fructus, in Quamtum, et Junkim regionibus Januario, Februario et Martio, sed in Xensy et Honan aliisque septentrionalibus Junio et Julio et Augusto maturescit. Arbor onerata purpureis hisce pomis, gratissimum exhibet aspectum, quae ne ab avibus decerpantur, continuis vigiliis custodiuntur."

The earliest record of the Kaki in English literature is probably that by Camellus (Kamel) in Ray's Historia Plantarum, Appendix, 1704, p. 54, where it is described under the name of Zapotl de China. This Appendix is entitled: Herbarum Aliarumque Stirpium in Insula Luzone Philippinarum Primaria Nascentium Syllabus, and the Kaki is placed under the head: "Arbores Pomiferae quarum Flos imo Fructui cohaeret. The author gives the Chinese name as Xicu; the Spanish as Chicoy, and the Portuguese, as Figocague. Evidently the Kaki was cultivated in the Philippines at that date, and it is still. The writer alludes to several varieties.

Bretschneider states that more than ninety drawings of the plants sent by Kamel were published by Petiver in his Gazophylacium Naturae et Artis, and a leaf, fruit and seed of the Kaki are represented in plate 45, under the name of Zapotl, with a reference to the Sylloge of Camellus.

In 1781 Linnaeus the younger's description appeared under the binomen *Diospyros Kaki*, and passing over a number of references given in the bibliography at the end, we come to the introduction and cultivation of the Kaki in England, which was effected through the agency of Sir Joseph Banks, in 1789.

The following popular account of the Kaki is extracted from Sargent's "Forest Flora of Japan."

"Although we have learned to look upon Japan as the home of the Persimmon, which is intimately associated with the expression of modern Japanese art, it is doubtful if either of the species of Diospyros commonly encountered in that country is really indigenous in the empire, where they were both probably introduced, with many other cultivated plants, from China. The more common and important of the two species is, of course, the Kaki, Diospyros Kaki, which is planted everywhere in the neighbourhood of houses, which in the interior of the main island are often embowered in small groves of this handsome tree. In shape it resembles a well-grown Apple-tree, with a straight trunk, spreading branches which droop towards the extremities and form a compact round head. Trees thirty or forty feet high are often seen; and in the autumn, when they are covered with fruit, and the leaves have turned to the colour of old Spanish red leather, they are exceedingly handsome. Perhaps there is no tree, except the Orange, which, as a fruit-tree, is as beautiful as the Kaki. In central and northern Japan the variety which produces large orange-coloured ovate thick-skinned fruit is the only one planted, and the cultivation of the red-fruited varieties with which we have become acquainted in this country is confined to the south. A hundred varieties of Kaki, at least, are now recognised and named by Japanese gardeners, but few of them are important commercially in any part of the country which we visited, and, except in Kyōto, where red Kakis appeared, the only form I saw exposed for sale was the orange-coloured variety, which, fresh and dried, is consumed in immense quantities by the Japanese, who eat it, as they do all their fruits, before it is ripe, and while it has the texture and consistency of a paving-stone.

"Diospyros Kaki, or an allied species, is hardy in Peking, with a climate similar to that of New England, and fully as trying to plant life; it fruits in southern Yezo, and decorates every garden in the elevated provinces of Central Japan, where the winter climate is intensely cold.

"There appears, therefore, to be no reason why it should not flourish in New England if plants of a northern race can be obtained; and, so far as climate is concerned, the tree, which, in the central mountain districts of Hondo, covers itself with fruit year after year, will certainly succeed in all our Alleghany region from Pennsylvania southward. In this country we have considered the Kaki a tender plant unable to survive outside the region where the Orange flourishes.

"This is true of the southern varieties which have been brought to this country, and which may have originated in south-eastern Asia, in a milder climate than that of southern Japan, for the Kaki is a plant of wide distribution, either natural or through cultivation. But the northern Kaki, the tree of Peking and the gardens of central Japan, has probably not yet been tried in this country. If it succeeds in the northern and middle states, it will give us a handsome new fruit of good flavour, easily and cheaply raised, of first-rate shipping quality when fresh, and valuable when dried, and an ornamental tree of extraordinary interest and beauty."

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XXX.—MISCELLANEOUS NOTES.

Maerua angustifolia.—This name has been applied to three distinct species: by A. Richard in 1831, and by Schinz in 1888 and 1897. *Maerua angustifolia*, A. Rich. in Guill. et Perr., Fl. Seneg. 1831, p. 29, t. 8, is a native of Senegal. Richard in 1847 carefully distinguished it from *M. oblongifolia*, A. Rich. (Tent. Fl. Abyss., vol. i, p. 32, t. 6), to which it is undoubtedly allied; but Oliver, Fl. Trop. Afr., vol. i, 1868, p. 85, reduced it to that species. In 1903, however, Gilg restored specific rank to *M. angustifolia*, A. Rich. (Engl. Jahrb., vol. xxxiii, p. 225); and comparison of the excellent figures accompanying Richard's descriptions is sufficient to justify the recognition of *M. angustifolia* as a distinct species.

Misled by Oliver's reduction of *M. angustifolia*, A. Rich., Schinz in 1888 described a new species from German South-West Africa under the same name (Abh. Bot. Ver. Brand., vol. xxix, p. 48). In 1897, however, Schinz transferred *Boscia angustifolia*, Harv. (1860) to *Maerua* as *Maerua angustifolia* (Harv.) Schinz (Bull. Herb. Boiss., vol. v, app. 3, p. 97). At the same time he reduced *Maerua angustifolia*, Schinz (1888) to *M. Guerichii*, Pax in Engl. Jahrb., vol. xix, 1894, p. 135.

Gilg in 1903, after restoring *M. angustifolia*, A. Rich., to specific rank, found it necessary to provide another name for *M. angustifolia*, Schinz (1888), and having overlooked Schinz's identification of that species with *M. Guerichii*, Pax, proposed for it the new name *Maerua ramosissima*, Gilg (Engl. Jahrb., vol. xxxiii, p. 227). Gilg (l.c. 228), identified *Boscia angustifolia*, Harv., with *Maerua Currori*, Hook. f., from description. This, however, is incorrect. The two species are not even closely allied. A new name has accordingly to be found under *Maerua* for *Boscia angustifolia*, Harv. and it is now proposed to call it *Maerua stenophylla*, Sprague. The synonymy of the three species under consideration is as follows :—

Maerua angustifolia, *A. Rich.* in Fl. Seneg., 1831, p. 29, t. 8; Tent. Fl. Abyss., vol. i, 1847, p. 32, in obs. *M. oblongifolia*, Oliv. Fl. Trop. Afr., vol. i, 1868, p. 85, partim, non A. Rich.

Maerua Guerichii, *Pax* in Engl. Jahrb., vol. xix, 1894, p. 135. *M. angustifolia*, Schinz in Abh. Bot. Ver. Brand., vol. xxix, 1888, p. 48, non A. Rich. *M. ramosissima*, Gilg in Engl. Jahrb., vol. xxxiii, 1903, p. 227.

Maerua stenophylla, *Sprague*, nom. nov. *Boscia angustifolia*, Harv. in Harv. et Sond. Fl. Cap., vol. i, 1860, addenda p. 19*; Thes. Cap. t. 134. *Niebuhria angustifolia*, Harv. Gen. ed. 2, 1868, p. 12. *Maerua angustifolia*, Schinz in Bull. Herb. Boiss., vol. v, 1897, app. 3, p. 97, non A. Rich., nec Schinz (1888).

T. A. S.

Botanical Magazine for May.—The plants figured are *Rhododendron lacteum*, Franch. (t. 8372); *Deinanthe caerulea*, Stapf (t. 8373); *Oncidium Sanderae*, Rolfe (t. 8374); *Lonicera Henryi*, Hemsl. (t. 8375) and *Villaresia mucronata*, Ruiz et Pav. (t. 8376).

The Rhododendron is a handsome species from China allied to *R. Falconeri*, Hook. f. The seeds were collected by the Abbé Delavay and a plant raised from them was sent to Kew in 1888 from the Jardin des Plantes, Paris. The subject of the illustration was received from Mr. F. D. Godman, South Lodge, Horsham, who has been the first to flower the Rhododendron in this country.

The *Deinanthe* is an interesting Saxifragaceous plant from China, seeds of which were sent home by Mr. E. H. Wilson from Nant'o in Hupeh. The only other member of this genus so far known is *D. bifida*, Maxim., from Southern Japan. *D. caerulea* was originally discovered by Mr. A. Henry at Hingshan, Hupeh. The plant figured was raised from seed by Mr. H. J. Elwes, Colesborne, Cheltenham, and flowered in Mr. Dimsdale's garden, Ravenhill, Lechlade.

Oncidium Sanderae is an interesting addition to the small group of species known as Butterfly orchids. The only other known species are *O. Papilio*, Lindl., from Trinidad and Venezuela, and *O. Kramerianum*, Reich. f., from Colombia and Ecuador. The species figured was collected by Mr. Forget on behalf of Messrs. F. Sander & Sons in the Moyobamba district, Peru.

The Honeysuckle (*Lonicera Henryi*) is another introduction due to the labours of Mr. E. H. Wilson in Hupeh, but the plant was originally discovered by Mr. A. Henry. The species belongs to the section *Nintooa* to which *L. Giraldii*, Rehder (*see* t. 8236), also

belongs. We are indebted to the Right Hon. L. Harcourt for the first specimen of this plant to flower in England. It is a free growing, evergreen climber which promises to be hardy.

Villaresia mucronata, a member of the natural order *Icacinaceae*, is a native of Concepcion in South Chile. It forms a handsome evergreen tree very like the common holly, but it is only hardy in a climate like that of the south-west of England. The material from which the illustration was taken, was sent by the Right Hon. the Earl of Ilchester from Abbotsbury.

Forestry in Hawaii*.—This report, containing 231 pages of letter-press and 45 pages of illustrations, deals with the main features of the work of the Department for the years 1909–10 in its three Divisions—Forestry, Entomology and Animal Industry. Forestry occupies upwards of 80 pages, and detailed accounts are given of the work of afforestation which is being carried on in the various islands in the Territory.

Forestry in Hawaii is conducted with two principal objects in view as set forth in the preface, page 3, in the following words :—

"The activities of the Division of Forestry can readily be divided into two parts: First, the creation and administration of forest reserves, for the most part areas of native Hawaiian forest covering important watersheds that it is advisable to keep intact for the protection of the supplies of water needed for irrigation, power development or domestic uses. Second, the extension of a forest cover over areas of waste or barren land, or in sections that can be used to better advantage for growing trees than for any other purpose."

For the first of these objects forest reserves have been created about the head-waters of streams, the watersheds and catchment areas, thus placing a limit on the cutting surface. This was made necessary by the reduction of the natural water supply consequent on the indiscriminate clearing of land for agricultural purposes, the growth of sugar-cane, coffee and other crops. For this class of forest, Hawaiian trees are relied on. Some of the chief are "Ohia Lehua" (*Metrosideros polymorpha*), "Koa" (*Acacia Koa*), "Mamane" (*Sophora chrysophylla*), and "Kukui" (*Aleurites triloba*). The second class of forest which is intended to supply the future timber requirements of the region, is being established on land which is of little value for agricultural purposes. Much of it is under Government control, but companies and private land owners are encouraged to plant, the experience of the Division's officers being given when required. This class of forest is composed almost exclusively of exotic trees. *Eucalyptus robusta*, *E. globulus* and *E. citriodora* are planted largely, and on page 50 a list of 25 Eucalypts is given which are being tried at the Haleakala Ranch. Two coniferous trees which obtain favour are *Cupressus macrocarpa* and *Cryptomeria japonica*. The kinds of trees under serious trial appear to be limited, and it is surprising that the Australian Acacias and the more important pines and hardwoods of the Southern United

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* Report of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii for the Biennial Period ending December 31st, 1910.

States are not in evidence. Reference is, however, made to various experiments which are being carried on in the introduction of trees and shrubs from other countries, so probably these are included.

The co-operation of government and private landowners in afforestation is advocated, and apparently, with this end in view, the Division strives to inculcate a love for trees and a desire for forest conservation in the minds of the general public, for trees are distributed free from government nurseries to planters of small numbers and at a trifling cost to those who plant on a more ambitious scale, while on Arbor Day they are given to all who may apply. Though in many ways the idea is an admirable one it goes a very short way towards satisfying the demands of practical forestry, and probably too much is made of it in the report.

The Superintendent of Forestry deals with the areas planted in the various islands, expenditure and experiments which are being made with various kinds of timber, while the Forest Nurseryman reports on the work of his department, the interchange of seeds, sale and distribution of plants, advising of private planters, the Tantalus Forest and Nuuanu Station.

The Botanical Assistant, in an interesting report, describes a project for the botanical exploration of certain out-of-the-way portions of the Hawaiian group, a botanical journey in North Kona, Hawaii, and the herbarium connected with the Division. Lists on interesting plants found on the above journey are given, and the following species reported to be new to science, discovered at an elevation of 2000 feet in the mountains at Punaluu, Oahu, are recorded. *Euphorbia Rockii*, C. N. Forbes, *Viola oahuensis*, C. N. Forbes, *Lysimachia longisepala*, C. N. Forbes, *Scaevola Swezeyana*, Rock, *Pittosporum Hosmeri*, Rock, *Sideroxylon rhynchospermum*, Rock, *Lysimachia glutinosa*, Rock, *Dubantia Waialealae*, Rock.

Illustrations of the following plants are given:—*Wilkesia Gymnoxiphium*, Gray., *Gossypium drynarioides*, Seem., *Lobelia Kauaensis* (Gray) Heller., *Brighamia insignis*, Gray., *Lobelia Gaudichaudii*, DC., *Argyroxiphium sandwicense*, DC. var. *macrocephalum*, Hbd., *Alectryon macrococcum*, Radlkf., *Pittosporum Hosmeri*, Rock, *Sideroxylon rhynchospermum*, Rock, *Dubantia Waialealae*, Rock.

In addition to the principal officials of the Division, 39 District Officers, 49 Fire Wardens and one Forest Ranger are included in the staff.

The report of the Superintendent of the Division of Entomology records the steps taken to combat various insect plagues which were causing harm to the melon, alligator pear, chrysanthemum and other plants. Details concerning experiments made with various washes are recorded. Elaborate arrangements have been made for the inspection of plants and fruits arriving from other countries, and the vigilance of the several officers has been rewarded by their being able to exclude a number of insect and fungoid diseases which are known to create serious harm elsewhere.

The latter pages of the report are devoted to the Division of Animal Industry, and, amongst other things, detailed accounts are given of efforts which are being made to improve the breeds of cattle and horses in the Territory and the treatment and prevention of various diseases of animals.

W. D.

Impatiens peltata

Mainy & Son's Lith.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 6.] [1911.

XXXI.—ON SOME SPECIES OF IMPATIENS FROM THE MALAYAN PENINSULA: II.

(With Plate.)

J. D. Hooker.

In the 1909 volume of this *Bulletin* (pp. 1–12), I enumerated with diagnoses all the Indo-Chinese and Malayan Peninsula species of *Impatiens* then known to me. Nine of these were natives of the latter territory, in which five hitherto unpublished species have more recently been discovered.

Of these last two are so remarkable as to some of their characters that I venture to offer them for early publication, reserving the others in anticipation of fuller discoveries, especially by Mr. Ridley, who is on a visit to unexplored regions of the States. In both species the distal lobes of the wings are confluent, a prevalent character in the Indo-Malayan balsams.

Impatiens peltata, *Hk. f.*, sp. nov.; *I. Ridleyi*, Hk. f., affinis, caule humile basi repente, foliis carnosulis peltatim petiolatis labelloque cupulare calcare breve recto spiniforme instructo differt.

Herba glaberrima, 1·5–2 dm. alta, mediocriflora; caule erecto basi longe repente simplice v. parce ramoso ramis robustis inferne longe nudis. *Folia* 3–5 cm. lata, alterna, peltatim petiolata, carnosula, orbicularia, acuminata, integerrima v. minutissime serrulata, basi rotundata, nervis utrinque 4–6 gracillimis, petiolo gracile 2–3 cm. longo 2–4 mm. a margine inserto; glandulae infrapetiolares 0. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii, erecti, petiolo breviores v. paullo longiores, basi ebracteati. *Flores* ad 2 cm. expansi, rosei, appendice (labello ?) flavido. *Sepala* 2, late oblique ovata, obtusa, 0·7–1·2 cm. longa, membranacea, costa nervisque obscuris. *Vexillum* flabelliforme, 1–1·5 cm. latum, muticum, costa gracile. *Alae* ad 2 cm. longae; lobi basales oblique pyriformes, longe stipitati, distales paullo breviores, in laminam orbicularem bifidam connatae; auriculae dorsales 0. *Labellum* amplum, saccatim infundibulare v. cupulare, inferne gibbose incurvum, supra gibbum calcare stricto spiniforme suberecto limbo labelli breviore instructum, ore horizontale obtuso. *Filamenta* linearia; antherae in capitulum decurvum connatae, obtusae. *Ovarium* gracile, fere rectum, acuminatum.

(20357—6a.) Wt. 118—9. 1125. 7/11. D & S.

Malay Peninsula. Mt. Murang: up a tributary of the Klong Pak Pla, in the N.W. corner of Lake Ta Lei Sap; about 7° 45′ N. and 100° 10′ E., in shady damp spots; "flower pink, process yellow"; *D. T. Gwynne Vaughan*, 264, in Herb. Kew. et Herb. Univ. Cantab.

The only species known to me having peltately attached petioles and a stiff, suberect, spiniform spur of the lip.

I. **Vaughanii**, *Hk. f.*, sp nov.; *I. macrosepalae*, Hk. f., affinis, foliis ovatis, sepalis obliquis apicibus lateralibus et calcare breve incurvo apice clavato bipartito differt.

Herba ramosa, glaberrima, 4–5 dm. alta, foliosa, floribus majusculis, caule gracile inferne nudo. *Folia* 8–12 cm. longa, alterna, longe petiolata, membranacea, ovata vel elliptica, acuminata, integerrima vel obscure crenata, basi rotundata vel late cuneata, utrinque 8–10- nervia, petiolo gracile 4–10 cm. longo; glandulae infrapetiolares 0. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii, flores subaequantes, basi ebracteati. *Flores* ad 3 cm. diametro, alis vexilloque purpureis, labello flavido. *Sepala* 2, tenuissime membranacea, 1·2–1·5 cm. longa, oblique oblonga, uno latere cuspidata, limbum totum labelli tegentia. *Vexillum* parvum, 1–1·2 cm. longum, oblongum, costa dorso carinata. *Alarum* lobi basales rotundati, breviter stipitati, 1–1·2 cm. lati, distales in limbum amplum rotundatum apice bifidum connati; auriculae dorsales basi connatae. *Labelli* limbus cymbiformis, in calcar breve incurvum apice clavatum et bilobum attenuatum, ore horizontale 1·2–1·8 cm. longo acuminato. *Filamenta* filiformia; antherae in capitulum connatae, obtusae. *Ovarium* gracile, acuminatum.

Malay Peninsula. Jalor: Biserat, Patani river, on damp rocks; Lat. 6° 32′ N., Long. 101° 12′ E.; "lower two perianth segments greenish-yellow—tubular process cream-yellow—other segments deep violet to purple"; *D. T. Gwynne Vaughan*, 535, in Herb. Kew. et Herb. Univ. Cantab.

I. Vaughanii differs from all other species of *Impatiens* known to me in the large delicately membranous sepals that embrace the whole lip so closely as to be recognised and removed with difficulty. Each sepal is of an irregular oblong form with the nerves from the base arching to the lateral apex.

Explanation of Plate.

Impatiens peltata. Figs. 1, sepal; 2, standard petal; 3, wing petals; 4, spur petal; 5, two stamens; 6, pistil. All enlarged.

XXXII.—ON SOME POTENTILLAS FROM THE FAR EAST.

H. Takeda.

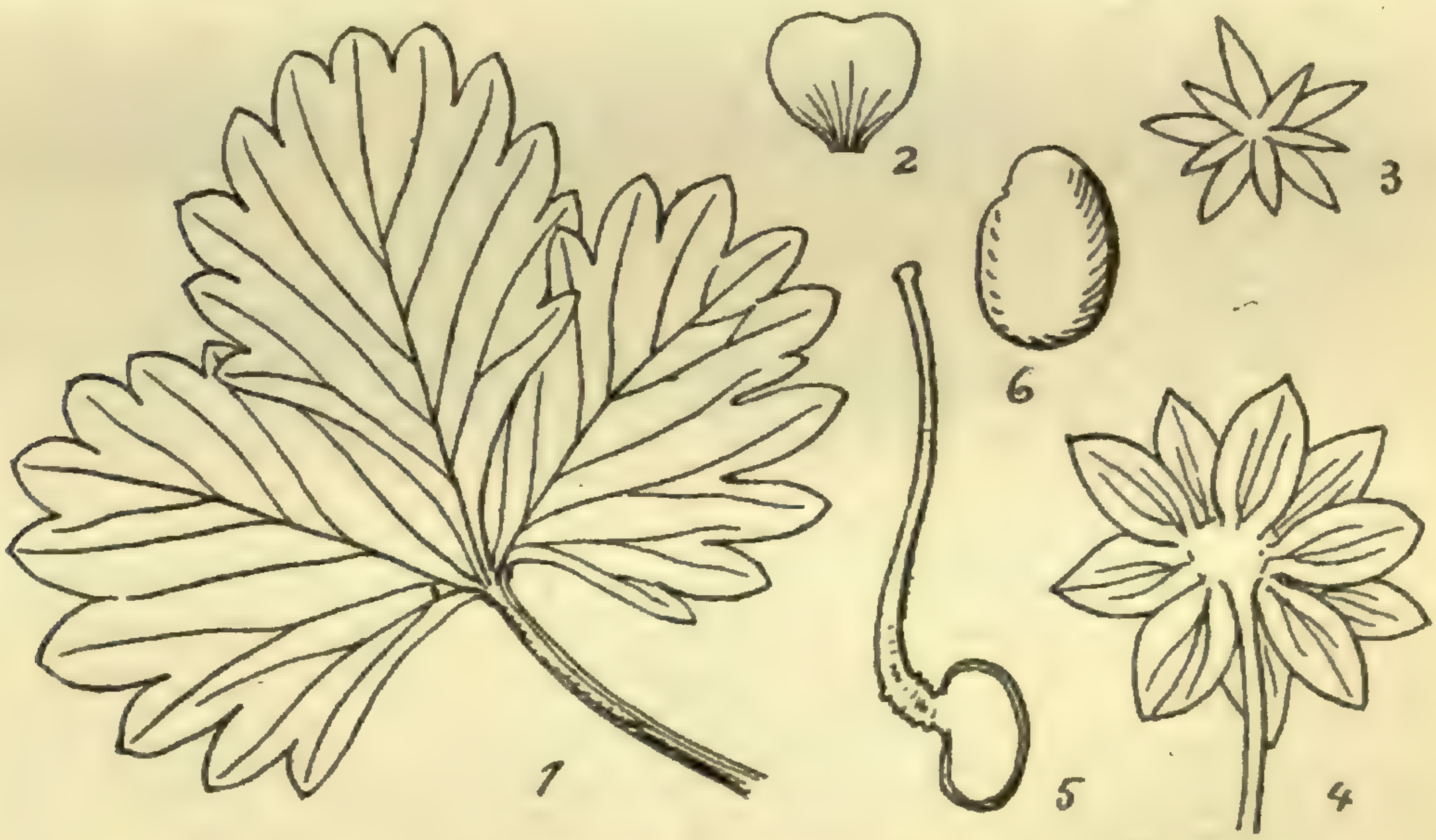
In this short paper I propose to clear up some misconceptions and confusion regarding a few Eastern Asiatic Potentillas. Since the publication of Th. Wolf's elaborate monograph the determination of Potentillas has been very much facilitated, and I hope few

mistakes will hereafter occur in any botanical publication. There seem still to remain some plants misreported from the Far East, which induces me to offer here some remarks from the phytogeographical as well as from the systematic point of view.

Under the name of *P. fragiformis* several different species have been reported. Also various views have been put forward with regard to the limit and relationship of *P. fragiformis*. Maximowicz and Hooker suggest that *P. grandiflora*, *P. gelida*, and *P. fragiformis* are the same species. As Th. Wolf states in his monograph (p. 510), *P. fragiformis* is often confused in herbaria with *P. grandiflora*, *P. gelida*, and *P. villosa*. Professor Miyabe in compiling the flora of the Kurile Islands at the Gray Herbarium studied these easily confused species and in his paper pointed out the different characters of the plants. He lays weight on the nature of the achene and regards those four plants as distinctive species, considering *P. grandiflora* and *P. gelida* as forming one group, while *P. fragiformis* and *P. villosa* form another. Th. Wolf discusses these plants and has thoroughly cleared up the previous misconception, so that there seems to be no need to add any further remark.

I wish to discuss here, however, the four other species known as *P. fragiformis*. The confusion is not unimportant from the phytogeographical point of view and will cause no little inconvenience if left untouched.

One of four plants reported as *P. fragiformis* is the true species. Descriptions of this can be found in Lehman's monograph as well as in Th. Wolf's recent work, and also a fairly good habit-figure in Lehman.



Potentilla fragiformis, Willd.

1. Radical leaf.—2. Petal.—3. Calyx at time of flowering.—4. The same in fruit.—5. Carpel ($\frac{12}{1}$).—6. Achene ($\frac{7}{1}$).

In the Far East this plant occurs in Amurland and the Ochotzk region, but not in any part of Japan.

The second one is a species closely allied to the preceding, but distinct and as it has been left unnamed, I propose to call it

P. megalantha because of its large flowers. The first specimen of *P. megalantha* was collected by Fr. Schmidt in the Island of Saghalien, who reported it as *P. fragiformis* in "Reisen im Amurlande und auf der Insel Sachalin." Afterwards the same species obtained at various places in Northern Japan was recorded by Prof. Miyabe in his Flora of the Kurile Islands under the same name. V. Komarov examined the specimens from Saghalien and from Kompumoi, Yezo, collected by Prof. Miyabe and preserved at the Kew Herbarium, and he considered them to be *P. fragiformis*. M. Palibine was kind enough to inform me that the Saghalien specimen was recently examined by Th. Wolf who also determined it as *P. fragiformis*. A study of these together with a good many specimens from Japan has brought me to the conclusion that the plant in question is distinct from the true *P. fragiformis* in the following points.

Potentilla megalantha, Takeda.

1. Carpel, immature ($\frac{7}{1}$).—2–5. Achenes ($\frac{7}{1}$).—6. Calyx after flowering.—7–8. Petals.—9. Radical leaf.

The achene of *P. megalantha* was described by Prof. Miyabe (Fl. Kuril., p. 231) as "more or less distinctly keeled." Close examination under a low power lens shows that it is not only keeled but really winged as may be seen in figs. 1–5, while that of *P. fragiformis* has only a slightly keeled ridge. Some botanists consider the marking of the achene is more important than the winged or keeled character. It may perhaps be so in the case of certain species, but not always. I have come across several instances of variation of the external nature of the achene in many species of *Potentilla*. In one and the same plant we can sometimes get both a smooth and a rugulose achene. The next marked distinction is to be found in the calyx. The calyx of *P. fragiformis* is only about 1·5 cm. across at the time of flowering, and after anthesis it increases its size enormously, becoming nearly twice as large as it was. This fact is also to be seen in Lehman's figure and also in descriptions by Maximowicz and Th. Wolf. A similar phenomenon also occurs in the allied species, *e.g.*, *P. Matsumurae*. The calyx of *P. megalantha* does, however, develop extremely slightly, so that the difference is hardly noticeable. Even in the flowering stage the size of the calyx of our plant is as large as that of *P. fragiformis* in fruit. The flower of *P. megalantha* is much larger than that of *P. fragiformis*, measuring about 4 cm. across. The petal is usually very shallowly notched. The hairy covering on the leaves of our plant is somewhat similar to that of the dwarf var. *lucida* of *P. fragiformis*, but the shape of the leaflets is rather peculiar. In the majority of cases I have noticed that the apex of the leaflet, or in other words, the central tooth which is traversed by the median vein, is markedly shorter than the adjacent teeth, so that the outline of the leaflet is obcordate and emarginate. The stipule of *P. fragiformis* is generally entire, while that of *P. megalantha* has a strong tendency to be lacerated or incised.

The third plant misreported as *P. fragiformis* is a rather distantly allied species :—*P. Freyniana*, Bornm. The plant was first recorded by A. Gray (Botany of Japan, p. 387), as *P. fragiformis* var. *japonica*. In 1873 Maximowicz described the plant as a variety of *P. fragarioides* and called it var. *ternata*, for it has ternate radical leaves. In 1902 Makino and Freyn independently raised this plant to the rank of a species and called it *P. ternata* adopting Maximowicz's varietal name. As there is already a plant bearing the name *P. ternata*, Bornmüller changed the name to *P. Freyniana*. The plant is distributed fairly widely in Eastern Asia and is quite common in Japan. This plant is again reported as *P. fragiformis* by Hemsley in Index Florae Sinensis. The specimens collected by Ross in Black Bear Valley, Shinking, in 1887, and also those collected by Mr. Henry in Ichang and Patung (nos. 349 and 1441), are quite obviously *P. Freyniana*. In the Kew Herbarium there exist other unpublished specimens of *P. Freyniana* from China collected by H. E. M. James in 1886 between Mukden and Tung-che-Hsien.

Until 1906 *P. Freyniana* was not known from China, when Matsuda reported it in the Tôkyô Botanical Magazine (vol. xx, p. 128), using one of its synonyms *P. fragarioides* var. *ternata*.

The specimen no. 1278, collected by Henry in Ichang and determined by Oliver as *P. fragiformis* and also referred to in Index Florae Sinensis by Hemsley, is neither *P. fragiformis* nor *P. Freyniana*, but in fact *P. fragarioides*. Henry's specimen collected in Yunnan (no. 10,905A), which is named *P. fragiformis* but not referred to in the Index, also represents *P. fragarioides*.

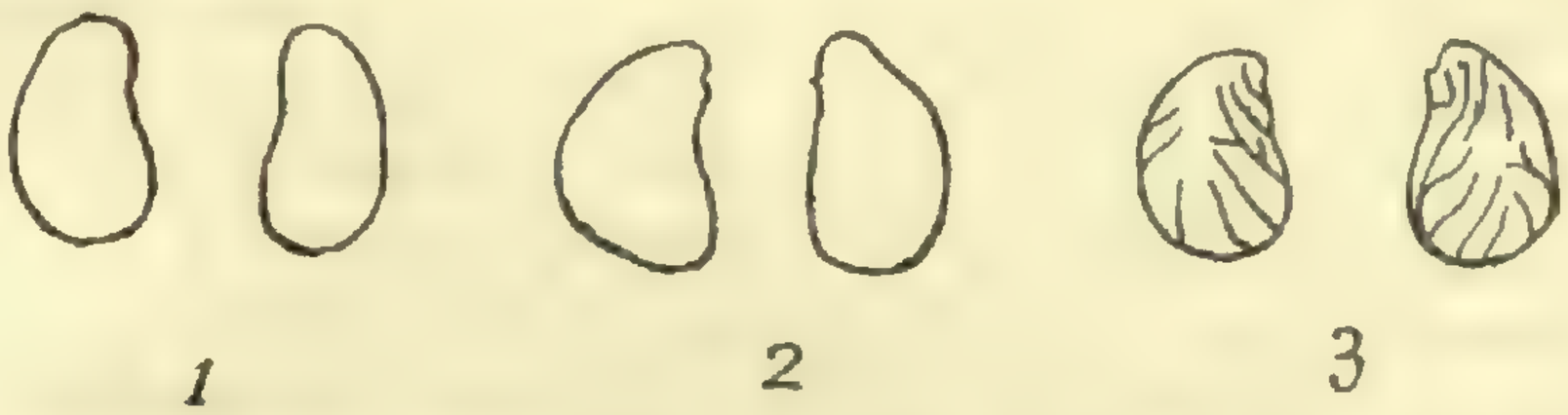
The separation of *P. Matsumurae* from *P. fragiformis* seems to be quite reasonable. The plant has long been known as *P. gelida* amongst Japanese botanists. Th. Wolf cites Franchet and Savatier's *P. fragiformis* var. *gelida* as one of the synonyms of *P. Matsumurae*. I rather fancy that the French authors meant *P. Freyniana* by this name. Before the publication of his monograph Th. Wolf himself called the plant by the name of *P. fragiformis*.

Th. Wolf published in his monograph a new variety of *P. Freyniana* called var. *grandiflora* (l.c. p. 640). The same plant was described by Makino in the Tôkyô Botanical Magazine (vol. xxiv, p. 142), with good reason as a new species :—*P. Yokusaiana*. According to the Japanese author this plant has subpinnate radical leaves besides the ternate one. He separates this plant from *P. Freyniana*, pointing out as characteristic the absence of the thick rhizome and the peculiar form and serration of the leaflet. This last character often serves for classifying plants empirically, and usually is very difficult to define.

The pinnate character of the radical leaf seems to me to be liable to variation in certain species. There is a specimen collected by Henry in Hupeh, which is not to be distinguished from *P. fragarioides*, although it possesses, like *P. Freyniana*, the ternate radical leaf; but by this feature alone we cannot recognise it as *P. Freyniana*.

P. Dickinsii, Franch. et Sav., was reduced by Makino to *P. ancistrifolia*, Bunge, of North China. Koidzumi calls it var. *Dickinsii* of *P. ancistrifolia*. In his monograph Th. Wolf tries to distinguish these plants as two distinct species, especially by the colour and marking of the achene, the hairs on the receptacle and by the number and texture of the leaflets. As I have been unable to examine any specimen of *P. ancistrifolia* from China, I will try, for the present, to judge their opinions by Wolf's and Komarov's descriptions, while I have examined a number of specimens of *P. Dickinsii*, including Dickins' collection. The texture of the leaf of *P. Dickinsii* may be called subcoriaceous and especially of the specimens growing in sunny dry places. Both surfaces and especially the nerves, which are prominent on the under surface, are covered with silky hairs as Franchet and Savatier point out. The cauline and even some of the radical leaves are often ternate, still I have seen in Dickins' specimens the inferior cauline ones are bi-jugous pinnate. The leaflet and especially the terminal one is generally petiolulate, but occasionally sessile ones are met with. In this species (and often in other species also), the number of leaflets is not constant. In *P. Dickinsii* the radical leaf varies from tri-jugous pinnate to simple with one rounded blade (forma

simplicifolia, Takeda, in Tôkyô Botanical Magazine, xxiv, p. 63). The colour of the achene is not always nigro-fuscous, but very often light-fuscous.



Potentilla ancistrifolia, Bunge var. *Dickinsii*, Kordz. Achenes.—1. Dickins. 2. Faurie, no. 13,395. 3. Faurie, no. 13,240 ; all ($\frac{1}{1}\frac{2}{1}$).

The surface is usually smooth and shining, but I observed that the specimens collected by Faurie (no. 13,240), at Towada, which have all the characters of *P. Dickinsii*, the achene is obliquely elevate-striated as the figure shows, which character is described as characteristic of *P. ancistrifolia*. The hair on the carpophore is generally long, but its length is rather variable. For the reasons above stated I really think *P. Dickinsii* should be united to *P. ancistrifolia*, as its variety ; and it is equally obvious that this variety should not be considered entirely the same as the typical form.

Descriptions of the New Species and Form.

Potentilla megalantha, *Takeda* ; *P. fragiformi*, Willd., affinis, a qua foliorum forma texturaque, floribus majoribus, calyce post anthesin paululum excrescente, petalis leviter retusis nec profunde emarginatis, annulis staminiferis pilosulis nec glabris, staminibus numerosioribus, acheniis alatis nec leviter carinatis satis distinguenda est.

Caudex crassus, pluriceps, caules plures pauci-vel plurifloros emittens. *Caules* crassi, validi, subcaespitosi, diffuse adcendentes, saepius ultrapedales (in speciminibus in rupibus siccis crescentibus caules pauciores debilioresque), dense pilosi, eglandulosi, 2–3-foliati, superne parce ramosi. *Folia* radicalia crassa, carnosula, plerumque longissime petiolata, majuscula, ternata, ambitu cordato-rotundata, apice emarginata, diametro ad 8 cm., supra dense pubescentia, juvenilia subsericea, infra densissime sericeo-villosa, micantia, margine dense villoso-ciliata, caulina radicalibus similia sed minora, brevius petiolata, floralia reducta, subsimplicia et sessilia vel brevissime petiolata ; stipulae foliorum radicalium membranaceae, extus villosiusculae, intus glabrae, latae, longe adnatae, auriculis ovato-oblongis tridentatis acutis acuminatisve ; foliola sessilia, ambitu flabellatim late obovata, terminalia obcordata, interdum breviter petiolulata, lateralia basi obliqua, margine profunde dentata, dentibus oblongo-ellipticis obtusis, mediis quam lateralibus plerumque brevioribus. *Flores* magni, aurei, initio breviter, post anthesin longe pedunculati, diametro ad 4 cm. interdum paulo ultra. *Calyx* villosus, post anthesin vix excrescens, 2–2·5 cm. diametro. *Sepala* externa vel rotundato-quadrata vel rotundato-ovata vel ovata, obtusa, anticum tridentatum vel subintegrum, breviora quam interna ovata ovato-lanceolatave acutaque. *Petala* late-obcordata,

retusa vel subtruncata leviterque sinuata, quam sepala interna duplo longiora (ad 1·8 cm. longa lataque) ; annulus staminifer plus minus pilosus, disco villoso a receptaculo separato. *Receptaculum* hemisphaericum, in fructu subglobosum, polycarpum, dense pilosum. *Carpella* oblongo-ovoidea, levia. *Stylus* subterminalis, basi brevi tractu leviter incrassatus, inde usque ad stigma dilatatum tenerrimus, carpello juvenili ad 6-plo (maturo duplo) longior. *Achenium* subauriforme, alatum, leve.—*P. fragiformis*, Fr. Schm., Reis. Amurl. Sachal. p. 127 ; Miyabe, Fl. Kuril. p. 231 : Matsudaira, in Tôkyô Bot. Mag. ix, p. 468, non Willd.—*P. grandiflora*, Maxim. in Bull. Acad. Imp. Sc. St. Petersb. xix, p. 167, pro parte.

Northern Japan. Yezo : without locality, *Maries* ; Kompumoi, *K. Miyabe*, 1. vii. 1884 ; rocks on the sea coast near Nemuro, *Faurie*, 3745, 5070 ; Eramachi, Oshima, *Miyabe* and *Tokubuchi*, 21. vii. 1890 ; Tumoshiri, *H. Takeda*, vii. 1909 ; Samani, prov. Hidaka, *Nirei*, 25. vi. 1893. Kurile : isl. Eturup, near Rubetsu, *Miyabe*, viii. 1884, *Mayr*, viii. 1890 ; isl. Urup, Tomarigawa, *K. Jimbô*, 15. vi. 1891; Megane, *T. Kitahara*, viii. 1895 ; Otoima-moi-pet, *K. Uchida*, 16. vi. 1891 ; isl. Ketoi, *Kodama*, vi. 1893 ; isl. Shimoshiri, *Kodama*, vi. 1893 ; isl. Shimushu, *T. Ishikawa*, vi. 1894, *K. Yendô*, viii. 1903. Saghalien : without locality, *Fr. Schmidt* ; Cheppopo, *T. Miyake*, 8. vii. 1908.

Potentilla fragarioides, *L.* var. stolonifera, *Maxim.* forma **trifoliolata,** *Takeda* ; foliis radicalibus ternatis ; a *P. Freyniana*, petiolis pilis patentibus villosis, foliolis supra pilosis subtus praesertim ad nervos adpresse villosis ciliatis, stipulis caulinis paucidentatis, floribus majoribus, sepalis exterioribus interiora ante anthesin superantibus distinguitur.

China. Hupeh, *Henry*, 7895.

XXXIII.—BLUE COUCH : A NEW LAWN GRASS.

(*Digitaria didactyla*, Willd.)

O. Stapf.

In the Agricultural Gazette of New South Wales of September 2, 1910, Mr. Maiden called attention to a grass, known at Sydney as "Blue Couch," the name referring to the blue-green hue the foliage assumes in summer. It seemed to have appeared first about 30 years ago, but without being much noticed until recently when it was also found in the Sydney Botanic Garden, the Federal Government House Grounds and in a private garden near Sydney. In every case it made its appearance in lawns, and although at first considered as an objectionable component it has now found some favour with experts as the following abstracts from the article referred to above will show.

Mr. T. G. Weston, head gardener, Federal Government House, states :

"It is a first-class grass for lawns, providing it be kept close mown and well watered during dry weather.

"Little or no top dressing is needed for the grass on ordinary lawns. On tennis lawns, &c., a light surfacing of fine sandy loam will be needed to keep a really good surface.

"In competition with Couch grass* it always obtains the mastery. Especially is this noticeable on closely cropped lawns. The dense growth of the Blue Couch appears to smother the Couch.

"Weeds such as clover, Oxalis, Medicago, &c., are just as troublesome on lawns covered by Blue Couch as those laid on Couch. It succumbs to asphalt or drought quicker than Couch does, but recovers much more rapidly. Lawns that were to all appearance dead, and upon the surface of which one has been afraid to use a broom, have, after a soaking by rain or sprinklers, recovered in two or three days to such an extent that the lawn-mower has been needed. It forms a denser surface than the Couch, and its runners are only about the same thickness.

"It travels over the surface much more slowly than Couch, but in forming new lawns, if seed were used, this would be an advantage, as the dense surface, so much desired, would be more quickly obtained. Providing it be kept close mown, it is an easy grass for the lawn-mower. If, however, it is allowed to obtain a little headway, especially during its flowering period, it will give the machine a large amount of trouble to reduce to a smooth uniform surface, as its stems pass in numbers between the knives and cutting-plate, and remain unsevered, presenting a mangled appearance. If the lawn-mower is in first-rate condition this does not happen, but practice and experience demonstrate that lawn-mowers are seldom in this much-to-be-desired state. If allowed to grow at will, few grasses give the really good scythe men more difficulty to mow creditably than this.

"Conclusions:—After two and a half years' experience I should still give Couch grass the preference for fine lawn work. It stands wear and tear better. It withstands drought better. During dull and showery weather it dries more quickly. It gives less trouble to the mowing-machine. It is quickly and easily repaired. Its runners lie closer to the ground. Weeds are removed more easily from it."

Even more favourable is a report furnished by Mr. Ernest A. Bonney, of Longueville, near Sydney, a gentleman who has had very considerable experience in regard to bowling greens and croquet lawns. He says:

"After an experience of five or six years of this grass on my croquet lawn at Longueville, on the Lane Cove River, my opinion is that it is much more suitable for bowling greens and croquet lawns in the coastal districts of New South Wales, especially in loamy or sandy soil, than the Couch, which is so generally used around Sydney. . . . My own lawn was made about nine years ago in dark sandy soil, the surface of which contained a considerable quantity of decayed vegetable matter. . . . About a fourth part of the lawn was turfed, and the remainder planted with Couch. About three years afterwards I noticed the Blue Couch, but do not know where it came from, as I have not seen it about Longueville.

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* This name stands here for *Cynodon Dactylon*. The objectionable Couch grass of England is *Triticum repens*.

It gradually spread, and now covers an area of 300 square feet, and is continuing beyond the boundary of the playing area, where it has an opportunity of running to seed. . . .

"The advantages of this grass over Couch are as follow:—1. It is much less trouble to keep it in order, as the leaves being soft and succulent, and there being an absence of tough runners, and the growth less rapid, the mowing during the summer months takes about a quarter of the labour.

"2. The leaves being broader and the roots forming a thick fibrous mass, the surface is always well covered and stands more wear, as there are no bare places to be pitted into holes by the rain and wind. The leaves being of a softer texture it is unnecessary to grind the lip of a Green's lawn-mower, as much less resistance is offered to balls passing over it, and that resistance remains more even throughout the day.

"3. It eradicates all other grasses and weeds on my lawn. Wherever it appears the Couch disappears entirely, and at the present time (17th June), when what we call winter grass and many objectionable weeds are coming up in the Couch, the parts covered with Blue Couch are perfectly free from all other grasses.

"4. It stands the cold weather better; it is still green and growing whilst the Couch is looking brown and its growth has stopped. A severe frost turns it brown.

"5. It requires less top-dressing, and is better without any, if there are no subsidences in a lawn. Only sufficient to level the surface should be put on, as it does not require fresh soil to feed upon. A little fertiliser is quite sufficient.

"The only objections that I know of are:—Firstly, it dies off sooner during a long term of hot dry weather; but it recovers very quickly after rain, and as all lawns during such times have to be watered, it is only a matter of using a little more water, the cost of which is less than that of the extra labour required by Couch. Secondly, the colour of the grass, which is never a bright green, being a blue green in summer and yellow green in winter; but as it is all one colour, this is preferable to the numerous tints which are so often found in a Couch lawn—especially during the winter. . . . It spreads on the lawn, where it is rolled and mown frequently, slowly in all directions, and does not send out runners, although it appears to do so when it reaches loose soil."

As the discovery of a new grass suitable for lawn making in warm countries where usually *Cynodon Dactylon* has to be used for that purpose is of considerable value, it is important to inquire into the origin and the natural affinities of the grass. As to the former, Mr. Maiden says that the grass is supposed to be of American origin, and he refers it with some hesitation to "a variety (*brevispicatum*) of the common summer grass, *Panicum* (*Digitaria*) *sanguinale*." From a letter by Mr. Maiden it appears that the author of the varietal name is Vasey and also that no description of it was published. A specimen of the grass was received at Kew three years ago when it was identified with an unnamed specimen of a *Digitaria* from Tonkin. The investigation was not then carried further; but on the receipt of additional material in November last it was taken up again, resulting in the establishment

of its status as a native of New South Wales. In fact it was collected as long ago as 1823 by that indefatigable collector Dr. Sieber at Port Jackson. He distributed it in his "Agrostotheca" under No. 72 and Nees named it *Panicum gracile* (in Sprengel, Syst. Veg. iv. ii. 33), but changed it subsequently to *Panicum subtile*, possibly because there was already a *Panicum gracile* in the field. He calls it (l. c.), *Panicum subtile*, R. Br., but how he came to connect it with Robert Brown is not clear, as there is no evidence of Brown having known it. Steudel on the other hand quotes it as *Panicum subtile*, Sieb. ex Nees [Syn. Pl. Gram., p. 41]. Curiously enough Sieber's specimen and the name escaped Bentham, so that they are not accounted for in the Flora Australiensis; nor in fact has the plant been collected again in Australia until quite recently. The reason why the species dropped so completely out of the agrostological literature was no doubt that it was never described properly and soon became lost in synonymy. Steudel in the 2nd edition of his Nomenclator Botanicus [1842], identified it with *Panicum distachyum*, while in his Synopsis Plantarum Graminearum, p. 41 (1854), it appeared under *Panicum bicorne*, as *P. subtile*, Nees in Sieb. Agr. N. Holl. no. 72, with this note "non differt (i.e. a *P. bicorni*), nisi racemis magis laxifloris, cf. *P. didactylon*, Kunth." There is no justification for its identification with *Panicum distachyum*, L. On the other hand, it is indeed indistinguishable from *Panicum didactylon*, Kunth (1833) = *Digitaria didactyla*, Willd. (1809). This was described from a plant collected by Bory St. Vincent in Mauritius in 1801 or 1802, and it has since been repeatedly collected in that island as well as in Réunion and Madagascar. We thus know it from the Mascarenes, Tonkin and New South Wales, and the probability is that it is more widely distributed throughout this area than its occurrence in herbaria would suggest. It may have been overlooked because it was mistaken for one of the more common tropical species of *Digitaria*, or indeed it may hide under one of the species described by Büse from the Malay Archipelago and not represented at Kew. Sieber either received it from Mauritius from his collectors Hilsenberg and Bojer or collected it himself during his short stay in that island early in 1823 and distributed it subsequently in his "Herb. Fl. Maurit." under no. 42. This number does not seem to have been named until Steudel in his "Nomenclator" (1841) referred to it as "*Panicum bicorne*, Sieber (Hrbr. Maurit. no. 42 et? Kunth, En. i. 83)," an unfortunate identification, as Kunth's *Panicum bicorne* is based on *Paspalum bicorne*, Lam., an Indian grass of clearly different affinity, and has in any case priority over "*Panicum bicorne*, Sieb." Bojer in his "Hortus Mauritianus" (1837) has no *Digitaria didactyla*, whilst Baker in his "Flora of Mauritius and the Seychelles" enumerates it as *Panicum didactylum*, Kunth, without further comment.

We have therefore accounted for the following synonymy for the Blue Couch Grass of New South Wales.

Digitaria didactyla, *Willd.* Enum. Hort. Berol. (1809), p. 91—*Panicum gracile*, Nees in Sprengel, Syst. Veg. vol. iv. pars. ii. (1827), p. 33, non R. Br. —*Panicum subtile*, Nees in Flora (1828), p. 300 (nomen) —*Panicum didactylum*, Kunth, Rev. Gram. (1839)

I., p. 33—*Panicum bicorne*, Sieb. ex Steud., Synox. Pl. Gram. (1854), p. 41, non Kunth.

Hasskarl in Plantae Javanicae Rariores (1841), p. 12 also, refers to *Panicum didactylum*, Kunth, as a possible synonym of *P. bicorne*, Kunth, but his account of the plants referable or possibly referable to the species he is dealing with is so confused that no notice of his suggestion need be taken.

From the indication of the distribution of *Digitaria didactyla* in Sprengel's Systema Vegetabilium, vol. i. (1825), p. 270: "Ins. Mascaren. Nov. Holland," it might be inferred that the new Australian lawn grass was already then known and recognised; but there is no doubt that "Nov. Holland" was added owing to the supposed, but mistaken identity of *Digitaria didactyla* (Ins. Mascaren.) with *Cynodon tenellus* R. Br. (Nov. Holland), which latter is quoted l. c. as a possible synonym.

Dr. A. Zahlbruckner kindly informs me that in the herbarium of the Vienna Hofmuseum there are two sheets of Sieber's Agrostotheca no. 72 with labels in what appears to be Sieber's handwriting, one of them containing the indication "Nova Hollandia," the other "Port Jackson." Both had been named *Digitaria didactyla* by Hackel as well as by Mez. As no full description of *Digitaria didactyla* exists, it may be useful to add one in this place.

Digitaria didactyla, *Willd.* *A perennial grass*, growing in loose or dense tufts, 10–40 cm. high, when in flower, often throwing out long (up to 40 cm. and more) many-noded runners which root from the nodes and give rise to few or many intravaginal innovation-shoots and flowering culms, terminating finally in an ascending culm or fascicles of such culms. *Innovation shoots* often bulbously thickened at the base, at length branching from basal leaf-axils, thus forming new young tufts of culms. *Runners and culms* very slender, 0·5–1 mm. thick, more or less wiry, particularly the former, terete, glabrous; terminal and subterminal culms like the runners, usually many-noded, internodes with the exception of the upper ones, usually 1–2·5 cm. long or near the base shorter; culms arising farther back on the runners, much shorter and with fewer nodes, erect or suberect or, if shortly ascending, then often rooting from the lowest nodes, simple or sparingly branched below. *Sheaths* membranous, rounded on the back, tight, the lowest (usually two) of the innovation-shoots reduced to broad, apiculate, bladeless, villously hairy, whitish cataphylls, the following, like all the lower sheaths of the flowering culms and those of the runners short, more or less hairy, particularly at the nodes, at length withering away, the upper mostly elongated and glabrous, uppermost of flowering culms up to 6 cm. long, all the sheaths or most of them somewhat shorter than the full-grown co-ordinated internodes. *Ligules* hyaline, truncate, denticulate, up to over 1 mm. long. *Blades* narrow-linear, attenuate to a fine point, those of the runner and the culm-leaves under or not much over 1 cm. long, upper culm-leaves similar or much longer (up to 6 cm.), 1·5–2 mm., rarely to 3 mm., wide, flat, soft, glabrous, smooth, rarely hairy. *Peduncles* (uppermost culm-internode) at length long exserted from the uppermost sheath, from 6 to over 15 cm. long, filiform, erect. *Racemes*, usually 2, sometimes 3, rarely more, digitate, sessile or nearly so, 2–4·5 cm.

long, suberect or more or less obliquely spreading, very slender, pale green; rhachis hardly wavy, under 1 mm. wide, green wings almost as wide as the whitish midrib, margins smooth or nearly so, internodes up to 1·5 (rarely 2) mm. long, pedicels paired, unequal, filiform, scaberulous, the primary one 1·5 to almost 2 mm. long, the other very short. *Spikelets* lanceolate, acute, 2 mm. long, pale green, adpressed to the rhachis. *Involucral glumes*: lower reduced to a very minute, rounded or ovate, nerveless, hyaline scale, upper oblong, obtuse or subacute, 1–1·5 mm. long, thin, 3-nerved, finely hairy; hairs in bands along the margin and between the nerves, with a short point. *Lower (empty) floret: Floral glume* (valve) lanceolate, acute, 2 mm. long, 7-nerved, in the dry state grooved between the nerves with the inner grooves hardly wider than the lateral, more or less finely hairy along the margins, hairs adpressed or spreading with short points. *Palea* an almost microscopic hyaline 2-lobed scale. *Upper (fertile) floret: Floral glume* (valve) lanceolate, acute, almost as long as that of the lower floret, thin-papery, often tinged with purplish-blue, delicately 5-nerved, at length somewhat firmer. *Palea* similar in shape and structure to the floral glume, but delicately 2-nerved. *Lodicules* subquadrate, 0·15 mm. long. *Stamens* 3, anthers linears, yellow, about 1·5 mm. long. *Ovary* lanceolate; styles capillary, up to 1·2 mm. long; stigmas exserted from the apex of the floret, purple 0·75 mm. long. *Grain* unknown.

Distribution and specimens examined :—

Mascarenes. Mauritius, *Bory de St. Vincent, Dupetit Thouars* (a specimen in the British Museum, from Willdenow's Herbarium), *Sieber*, Fl. Maurit. ii., 42, *Bouton, Ayres;* Réunion,* *Balfour.*

Madagascar. Central Madagascar, *Baron*, 4253; South Madagascar, Fort Dauphin, "prostrate, matted, sandy dunes," *Scott Elliot;* without precise locality, *Gerrard*, 82.

Tonkin. Tankeuin, near Guang-yen, "croissant en touffes compactes . . . . . sur les rochers calcaires," *Balansa*, 460.

Australia. New South Wales, "Port Jackson," *Sieber*, Agrostoth. 72; Sydney, *Maiden.*

The affinity of the grass lies evidently with *D. sanguinalis*, L., from which it differs, however, sufficiently in its perennial duration and peculiar mode of growth, the fine blades, the small number of racemes and their slender build, the smaller spikelets and the evenly grooved appearance of the glume of the lower floret, at least when dry. To this might be added as a secondary anatomical character the smaller size of the wavy-walled cells of the glume of the fertile floret and their smaller number of folds (3–4) against those of *D. sanguinalis* (6–7). Although I have examined all the specimens mentioned above for grains, I have not found a single one, even in racemes which had already shed most of their spikelets and were to all appearances perfectly mature.

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* "Dans les champs incultes," Cordemoy, Flore de l'Ile de la Réunion, p. 117.

XXXIV.—DIAGNOSES AFRICANAE: XLIII.

1271. **Oncoba Routledgei**, *Sprague* in Gard. Chron. 1911, vol. xlix. p. 323 anglice [Flacourtiaceae-Oncobeae]; glabritie foliorum et cursu nervorum lateralium *O. spinosae*, Forsk., stylo apice in ramos circiter 8 breves capitatos diviso necnon antheris brevibus *O. brachyantherae*, Oliv., accedens.

Frutex usque ad 6 m. altus, spinis axillaribus usque ad 2·5 cm. longis. *Folia* breviter petiolata, elliptico-oblonga vel oblonga, breviter obtuse acuminata, basi obtusa vel rotundata, 6·5–11·5 cm. longa, 3–5·5 cm. lata (in plantis juvenilibus pro rata angustiora), grosse crenato-serrata, fere glabra, exsiccando tenuiter coriacea; nervi laterales utrinque 5–6, satis obliqui, versus marginem excurrentes, subtus elevati; venae primariae quam ceterae multo magis distinctae, parallelae, sub angulo recto e nervo medio ortae, 1–2 mm. distantes. *Sepala* 4, sub fructu juvenili reflexa. *Petala* circiter 8. *Antherae* oblongae. *Stylus* apice in ramos circiter 8 breves capitatos divisus.—*Oncoba spinosa*, var. *Routledgei*, Hort. ex. Gard. Chron. 1911, vol. xlix. p. 236.

Tropical Africa. Uganda: Mt. Ruwenzori, 2400 m., *Dawe*, 650. British East Africa: Aberdare Mts., 1900–2100 m., *Battiscombe*, 51; Nyeri District, *W. S. Routledge*. German East Africa: Usambara; Gonja, *Holst*, 4217; Uluguru Mts., *Goetze*, 227.

O. Routledgei was raised by Mr. C. E. Shea from seed sent him by Mr. James Routledge and collected in East or Central Africa.

1272. **Hoffmanseggia Pearsonii**, *Phillips* [Leguminosae-Eucae-salpinieae]; affinis *H. rubrae*, Engl., sed ramis albescentibus distincte maculatis, pinnis utrinque 3–4-jugis, foliolis paucioribus, floribus multo minoribus maculatis differt.

Suffrutex 30 cm. altus. *Rami* laeves, juniores albo-tomentosi, nigro-glandulosi, demum cortice cinereo obtecti. *Folia* bipinnata, 2·8–4·3 cm. longa; rhachis tomentella, superne pilosa, nigro-glandulosa; foliola opposita, subsessilia, oblonga, utrinque rotundata, 4–7 mm. longa, glabra, nigro-glandulosa; stipulae lineares, 4–5 mm. longae, tomentosae, nigro-glandulosae, ciliatae; stipellae minutae. *Racemi* axillares, floriferi 2·5 cm. longi, fructiferi 13 cm. longi, circiter 12-flori; pedunculus breviter pubescens, nigro-glandulosus; pedicelli 2·5 mm. longi; bracteae minutae. *Calycis tubus* 1·5 mm. longus; lobi 6 mm. longi, lineares, minute pubescentes, nigro-glandulosi, decidui; anterior latior. *Corolla* 6 mm. longa, glabra. *Stamina* libera; filamenta 4·5 mm. longa, linearia, apice angusta, inferne ciliata; antherae 1 mm. longae, ellipticae. *Stylus* 2·5 mm. longus, teres, glaber, persistens, stigmate terminali. *Ovarium* subsessile, 9 mm. longum, subfalcatum, pilosum, dense nigro-glandulosum; ovula circiter 5. *Legumen* leviter pedicellatum, reflexum, compressum, falcatum, apice acutum, 2·5–2·7 cm. longum, 7 mm. latum, parce setosum, setis pilosis, nigro-glandulosum.

South Africa. Bechuanaland: between Chue Vley and Moshowing River, *Burchell*, 2400; Great Namaqualand: Club River Bed at Gobas, 1200 m., *Pearson*, 3747; Sandy River Bed at

Sandverhaar, 945 m., *Pearson*, 4652 ; river bed at Holoog, 760 m., *Pearson*, 4122.

Tropical Africa. German South West Africa : Okahandja, *Dinter*, 442.

1273. **Combretum tanaense**, *J. J. Clark* [Combretaceae]; valde affinis *C. cuspidato*, Planch., sed folii acumine brevi obtuso subemarginato et disco minus conspicuo distinctum.

Frutex scandens, ramis novellis fusco-pilosis adultis glabris, cortice olivacco. *Foliorum* petioli breves, minute griseo-pubescentes, 0·8–1 cm. longi ; laminae novellae glutinoso-lepidotae, exsiccando nigricantes, demum glabrae, coriaceae, multo pallidiores, lepidotae, obovato- vel elliptico-oblongae, basi rotundatae et minute cordatae, apice in acumen breve obtusum emarginatum productae, 8–15 cm. longae, 4–7·6 cm. latae ; nervis lateralibus subtus valde prominentibus circiter 9 adscendentibus arcuatim connectis, venis laxis angulis subacutis ortis. *Spicae* e foliis summis ortae, quasi in paniculam terminalem basi foliatam collectae, numerosae vel paucae, cylindricae, subdensae, omnibus inflorescentiae partibus fusco-velutinis ; bracteae lineares, 1 mm. longae, mox deciduae. *Receptaculum* extus glutinoso-lepidotum et dense fusco-pubescens, inferius fusiforme, 2 mm. longum, superius campaniforme, 1 mm. longum intus supra discum glabrum pilosum, obscure 4-lobum, lobis brevissime triangularibus. *Petala* breviter unguiculata, transverse elliptica, reflexa, 1 mm. longa, 1·2 mm. lata. *Stamina* exserta, filamenta 4·5 mm. longa. *Fructus* ignota.

Tropical Africa. British East Africa : Tana River, 90 m., *Battiscombe*, 237.

Scandent tree, growing close to the water's edge.

1274. **Sonchus Tysonii**, *Phillips* [Compositae-Cichoriaceae] ; affinis *S. rarifolio*, Oliv. et Hiern, caule pilis glanduligeris instructo, foliis bene evolutis setosis basi auriculatis, capitulis latioribus, involucri bracteis setoso-glanduligeris differt.

Planta 25–30 cm. alta, basi foliata. *Folia* elliptica, oblonga vel oblonga-oblanceolata, apice acuta vel rarius subacuminata, basi amplexicaulia, auriculata, 10–15·5 cm. longa, 2–6 cm. lata, margine irregulariter et acute repando-dentata membranacea, setosa, ciliata, nervis lateralibus utrinque circiter 10 patulis prominentibus intra marginem anastomosantibus. *Scapus* 15–25 cm. longus, nudus, capitula 5–8 gerens, glanduloso-setosus ; bracteae lanceolatae vel subulato-lanceolatae, acutae, 1·5–2·5 cm. longae, basi 4 mm. latae, dense glanduloso-setosae. *Capitula* breviter pedunculata, subcorymbosa, 2 cm. longa, circiter 20-flora. *Involucri bracteae* 2–3-seriatae, lanceolatae, sensim acuminatae, apice acutae, extus glanduloso-setosae, margine submembranaceae. *Receptaculum* planum ; paleae lineares, 3 mm. longae. *Pappi setae* albae, 1 cm. longae, graciles, minute barbellatae. *Corollae limbus* 1·6 cm. longus, apice dentatus, basi attenuatus, pilosus. *Antherae* 6 mm. longae, basi sagittatae ; filamenta 7 mm. longa. *Stylus* exsertus, 1·5 cm. longus, filiformis, ramis 2 mm. longis. *Achaenia* compressa, utrinque attenuata, 7 mm. longa, remote sulcata, minute puberula.

South Africa. Natal : Inanda, *Wood*, 1381. Griqualand East ; on slopes near Kokstad, *Tyson in Herb. Austro-Afric.*, 966.

1275. **Crotonogyne ikelembensis**, *Prain* [Euphorbiaceae-Crotoneae]; species *C. Poggei*, Pax, proxime accedens, sed foliorum forma, indumento pro parte lepidoto nequaquam setoso floribusque maris majoribus satis differt.

Frutex, ramulis lepidotis et stellato-pubescentibus. *Folia* alterna, sparsa, breve petiolata, chartacea, obovata, acuta, a triente summo versus basin subito late cuneatum angustata, margine integra parce setosa, 15–25 cm. longa, 5–9 cm. lata, supra saturate viridia, subtus pallidiora, utrinque glabra; nervi laterales utrinsecus 12–14; petiolus parce lepidotus et stellato-pubescens, 1 cm. longus, crassus; stipulae ovatae, acutae, parce lepidotae et stellato-pubescentes, 5 mm. longae. *Racemi* ad 35 cm. longi, simplices vel parce ramosi; rhachides lepidoti et stellato-pubescentes; flores masculi glomerati, glomeruli pauciflori, inferne 2·5 cm. superne 6–8 mm. remoti; pedicelli brevissimi; bracteae 2-glandulosae. *Calyx* maris globosus, minute apiculatus, in alabastro clausus, demum valvatim 3-lobus, raro 4-lobus, extra dense stellato-pubescens et parce lepidotus. *Corolla* alba, gamopetala, calyce brevior, tubo campanulato intus hirsuto, limbo distincte lobato lobis truncatis vel parum emarginatis. *Stamina* circiter 18, exteriora 5, glandulis extrastaminalibus in urceolum lobatum extra pubescens connatis circumcincta. *Flores feminei* ignoti.—*C. Laurentii*, var. *ikelembense*, De Wild. in Ann. Mus. Congo, Bot. sér. 5, ii. 278, t. 73, fig. 2; Dur. Syll. Fl. Cong. 490.

Tropical Africa. South Central. Congo State: Equatorial Province; Bombimba on the Ikelemba river, *Laurent*.

1276. **Crotonogyne impedita**, *Prain* [Euphorbiaceae-Crotoneae]; species *C. Laurentii*, De Wild., quam maxime affinis sed racemis masculis simplicibus, calyce maris fere glabro, corollaque maris margine subintegra facillime distinguenda.

Frutex 2–2·5 m. altus, ramulis stellato-pubescentibus. *Folia* alterna, sparsa, breve petiolata, chartacea, anguste oblonga, apice acute acuminata, basi abruptius in petiolum spurium subalatum quam petiolus verus 4–5-plo longiorem contracta, margine integra, glabra, 25–30 cm. longa, 6–9 cm. lata, supra saturate viridia, subtus pallidiora, utrinque glabra; nervi laterales utrinsecus 10–12: petiolus 6–8 mm. longus, densius stellato-pubescens; stipulae ovatae, acuminatae, 4 mm. longae, stellato-pubescentes et pilis rigidiusculis simplicibus hirsutae. *Racemi* 15–50 cm. longi, simplices; rhachides stellato-pebescentes; flores masculi glomerati, glomeruli pauciflori; feminei solitarii, pauci, versus apicem rhachidis; pedicelli masculi brevissimi, feminei primum 6 mm. demum 12 mm. longi, stellato-pubescentes; bracteae 2-glandulosae. *Calyx* maris globosus, minute apiculatus, in alabastro clausus demum valvatim 2-lobus, 2 mm. latus, extra pilis stellatis perpaucis exceptis glaber. *Corolla* alba, gamopetala, calyce brevior, tube campanulato intus hirsuto, limbo integro. *Stamina* circiter 10, exteriora 6, glandulis extrastaminalibus in urceolum crenulatum connatis circumcincta. *Calyx* feminei oblongus, parce lepidotus et dense stellato-pubescens, 4 mm. longus; lobi 5, anguste oblongi, obtusi, eglandulosi vel parce glandulosi. *Petala* 5, alba, imbricata, calyce longiora. *Discus* urceolatus. *Ovarium* dense stellato-pubescens et pilis simplicibus

rigidis setosum ; styli 3, singuli 3-partiti. *Capsula*, nimis juvenilis, stellato-pubescens et parce setosa.

Tropical Africa. Upper Guinea. Cameroons : Johann-Albrechtshohe, 200 m., *Buesgen*, 163 ; Lom, 200–300 m., *Lederm ann*, 6397.

1277. **Crotonogyne lasiocarpa**, *Prain* [Euphorbiaceae-Crotoneae] ; species *C. impeditae*, Prain, affinis sed flore femineo tetramero stylisque singulis 7–8-partitis facillime distinguenda.

Frutex, ramulis lepidotis. *Folia* alterna, sparsa, breve petiolata, chartacea, oblongo-ovata vel oblanceolato-oblonga, acute acuminata, a triente summo versus basin acutum angustata, margine integra, glabra, 15–30 cm. longa, 5–11 cm. lata, supra saturate viridia, subtus pallidiora ibique parce lepidota ; nervi laterales utrinsecus 8–15 ; petiolus lepidotus, 1–3 cm. longus ; stipulae ovatae, acuminatae, lepidotae et parce stellato-pubescentes, 6–8 mm. longae. *Racemi* ad 24 cm. longi, simplices vel feminei parce ramosi ; rhachides lepidoti ; flores masculi glomerati, glomeruli pauciflori ; feminei solitarii versus apices rhachidis ramulorumque ; pedicelli masculi brevissimi, feminei primum 4 mm. demum 10 mm longi, lepidoti ; bracteae 2-glandulosae. *Calyx* maris globosus, minute apiculatus, in alabastro clausus, demum valvatim 2-lobus, extra dense lepidotus. *Corolla* alba, gamopetala, calyce brevior, tubo campanulato intus hirsuto, limbo breviter lobato. *Stamina* circiter 10, exteriora 6, glandulis extrastaminalibus liberis discretis circumcincta. *Calyx* feminei oblongus, dense lepidotus, 4 mm. longus ; lobi 4, anguste oblongi, subacuti, eglandulosi. *Petala* 4, alba, imbricata, calyce vix longiores. *Discus* alte lobatus. *Ovarium* lepidotum et pilis simplicibus rigidis setosum ; styli 3, singuli 7–8-partiti. *Capsula*, nimis juvenilis, lepidota et parce setosa.

Tropical Africa. Lower Guinea. Spanish Guinea : Akonangi, *Tessmann*, 947, 991, 1002.

1278. **Neoboutonia glabrescens**, *Prain* [Euphorbiaceae-Crotoneae] ; species *N. Mannii*, Benth., et *N. diaguissensi*, Beille, quam maxime affinis ab ambabus tamen pilis simplicibus elongatis omnino mancis facillime cognoscenda.

Arbuscula 3·5–4·5-metralis, ramulis parcissimo stellato-scrobiculatis. *Folia* distincte petiolata, membranacea, orbiculari-cordata, acuta, margine integra, 10–20 cm. longa lataque, laete viridia, utrinque secus nervos, venas, reticulationesque parce stellato-scrobiculata ceterum glabra ; petioli minute scrobiculati ; stipulae minutae, caducae. *Flores masculi* copiose paniculati, distincte pedicellati ; rhachides ramulisque panicularum parce scrobiculatae. *Calyx* glaber, in alabastro globosus, clausus, dein apertus 2 mm. latus. *Stamina* 15–20 ; filamenta gracilia, antheris longiora ; antherarum connectivi apice glandula singula, nonnunquam glandulis 2–3 cereis, minutis, deciduis instructi. *Flores feminei* in racemos copiose ramosos dispositi, parvi, 4 mm. longi, 6 mm. lati. *Sepala* triangularia, pubescentia, in tubum lobis longiorem connata. *Ovarium* 3-loculare ; styli 3, 2-partiti, lobis linearibus. *Fructus* ignotus.

Tropical Africa. Upper Guinea. Cameroons : Victoria ; Bimbia, *Preuss*, 1288 ; Kribi ; Bipinde, 400–480 m., *Zenker* 1527,

3202a. Yaunde ; Epfasa, 820 m., *Zenker*, 1430. Lower Guinea. Spanish Guinea : Nkolentangan, 450 m., *Tessmann*, B 133 ; Akonangi, *Tessmann*, 982.

1279. **Neoboutonia Melleri**, *Prain* [Euphorbiaceae-Crotoneae] ; species *N. africanae*, Muell.-Arg. et *N. canescenti*, Pax, quam maxime affinis ab ambabus tamen foliis parum rigidioribus, floribus masculis sessilibus vel fere sessilibus apte distinguenda.

Arbor 9–10-metralis ; ramuli tomento stellato rufo-cinereo scrobiculati. *Folia* distincte petiolata, firmula, orbiculari-cordata, acuta vel obtusa, margine integra, 10–20 cm. longa ac lata, laete viridia, supra secus nervos et reticulationes parce hirsuta tomento stellato et pilis longiusculis albidis, subtus ubique dense tomento perbrevi stellato continuo glandulis minutis applanatis intermixto induta ; petioli parce scrobiculati ; stipulae lineares. *Flores masculi* copiose paniculati, sessiles vel fere sessiles ; rhachides ramulique panicularum scrobiculati. *Calyx* in alabastro clausus, globosus, apicem versus hirsutus, dein apertus 3 mm. latus. *Stamina* 25–30 ; filamenta gracilia antheris manifeste longiora ; antherarum connectivi apice glandulis saepissime 3, nonnunquam 1, minutis, cereis, deciduis coronati ; glandulae extrastaminales 5, oblongae, truncatae vel emarginatae. *Flores feminei* racemosi racemis compositis, parvuli, 4 mm. longi, aperti 6 mm. lati. *Sepala* lineari-lanceolata, basi in tubum perbrevem connata. *Ovarium* 3-loculare, densius strigosum ; style 3, singuli 2-partiti lobis linearibus. *Capsula* 3-cocca, coccis 2-valvis, 8 mm. longa lataque, fusca, pubescens. *Semina* subglobosa, hilo facie interiore deorsum producto.—*N. canescens*, Pax in Engl. Bot. Jahrb. xix. 91 pro parte maxima sed spp. Schweinfurthiana excludenda ; Engl. Pflanzenw. Ost.-Afr. C, 238 ; Dawe Rep. Bot. Uganda 56. *Mallotus Melleri* Muell.-Arg. in Flora, 1864, 468 ; DC. Prodr. xv. 2, 959 ; Dawe, Rep. Bot. Uganda, 56.

Tropical Africa. Nile Land. Uganda : Western Prov. ; Toro, on the banks of the river Nsongi, 1220 m., *Dawe*, 841 ; on the Bigera river, 1220 m., *Bagshawe*, 1130 : Ankole, 1520 m., *Dawe*, 445, 475. South Central. Congo State : Eastern Prov. ; Ruwenzori, 1220 m., *Mildbraed*, 2477, 2744. Mozamb. Dist. German East Africa : Bukoba, *Stuhlmann*, 1097, 1150, 1565, 1582, 3321, 3745 ; Kabotschi, *Fischer*, 527. Nyasaland : Zomba, *Whyte*, 91 ; Manganja Hills, *Meller* ; Shire Highlands, *Buchanan*, 12, 21, 344, 1498.

1280. **Neoboutonia velutina**, *Prain* [Euphorbiaceae-Crotoneae] ; species *N. africanae*, Muell. Arg. affinis sed foliis subtus velutinis nec appresse glanduloso-stellato-scrobiculatis ovarioque dense velutino facillime cognoscenda.

Arbor 15–19-metralis ; ramuli parce pilis stellatis glomeratis obtecti. *Folia* distincte petiolata, membranacea, orbiculari-cordata, acuta, margine integra, 10–20 cm. longa lataque, laete viridia, supra secus nervos pilis longiusculis albidis basi bulbosis vel ibi pilis brevioribus stellatis basi circumcinctis molliter pubescentia, subtus ubique tomento brevi stellato laxiusculo molliter velutina ; petioli breviter scrobiculati ; stipulae lineares, rigidiusculae,

persistentes. *Flores masculi* copiose paniculati, distincte pedicellati ; rhachides ramulisque panicularum minute scrobiculatae. *Calyx* apice pubescens, in alabastro globosus, clausus, dein apertus 3 mm. latus. *Stamina* 20–25, filamenta gracilia antheris vix longiora ; antherarum connectivi apice glandulis 3, raro 1, cereis minutis deciduis instructi. *Flores feminei* in racemos copiose ramosos dispositi, parvi, 4 mm. longi, 6 mm. lati. *Sepala* lineari-lanceolata, pubescentia, basi in tubum perbrevem connata. *Ovarium* 3-loculare, dense stellato-velutinum ; styli 3, 2-partiti, lobis linearibus. *Capsula* 3-cocca, 6 mm. longa lataque, dense velutina.

Tropical Africa. Upper Guinea. Cameroons : Bamenda, 1670 m., *Ledermann*, 1924 ; Ntem, 970 m., *Ledermann*, 2049 ; Labane, 1060 m., *Ledermann*, 2242 ; Yakuba, 1340 m., *Ledermann*, 5484 ; Tukurua, 1280 m., *Ledermann*, 5567 ; Babadju, 1580 m., *Ledermann*, 5987.

XXXV.—GRAFT HYBRIDS*

(With Plates.)

W. J. Bean.

Although it is now between eighty and ninety years since *Laburnum Adami*, the first graft hybrid, appeared, the remarkable diversity of blossom borne on the one tree remains a perpetual source of interest and wonder. It is curious that its history is not by now better known. During the past Laburnum season, twelve to twenty specimens a week have been received at Kew to be named, mostly with an indication that the senders had not seen or heard of such a tree before. Letters have also appeared in the daily press on the same subject. It may, therefore, be worth while to recount the origin and history of *Laburnum Adami*, which, briefly, is as follows :—

In 1825, a nurseryman of Vitry, near Paris, named Jean Louis Adam, grafted the dwarf purple broom, *Cytisus purpureus*, on the common Laburnum. At the union of the scion with the stock there subsequently appeared a shoot which bore flowers of a purplish yellow, and, to all seeming, intermediate between those of the purple broom and the Laburnum. This was propagated and called after its raiser, and is the *Laburnum Adami* as we know it to-day. A few years after it had been distributed from Adam's nursery a further curious phenomenon was observed. It was seen that portions of the tree had a tendency to revert back to one or other of the "parent" species, so that a single tree would carry at one time three different sorts of flowers, viz., the purplish flowers of the presumed hybrid, those of *Laburnum vulgare*, and those of *Cytisus purpureus*. The tree has retained this remarkable characteristic until the present time. The branches that bear the flowers of true Laburnum and *Cytisus purpureus* are in every way characteristic of their respective species, which they reproduce quite true from seed

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* *See* E. Jouin in *Le Jardin*, 1899, p. 22 ("Le Néflier de Bronvaux") ; and D. H. Campbell in *The American Naturalist*, vol. xlv., p. 41 ("The Nature of Graft Hybrids").

and from cuttings. *Cytisus purpureus* appears as a dense tuft of twigs suggestive of witch's broom. The hybrid has very much the general aspect and foliage of a Laburnum, but the raceme is shorter, the flowers are purplish, and, so far as I have observed, invariably sterile.

Crataego-mespilus Dardari, *Simon-Louis.*

During the May and June just past there has flowered at Kew a tree which shows much the same peculiarities as *Laburnum Adami*. It is known as *Crataego-mespilus Dardari* and is a graft hybrid between the common hawthorn (*Crataegus Oxyacantha*) and the medlar (*Mespilus germanica*). It first appeared on an old medlar tree growing in the garden of M. Dardar at Bronvaux near Metz, that had been grafted on a stock of hawthorn. A branch was noticed originating from just beneath the graft which showed characters intermediate between those of hawthorn and medlar. The leaves and fruits, although smaller, were those of the medlar, but the branches were spiny and the flowers appeared in corymbs as in the hawthorn. The branch was propagated in the nursery of Messrs. Simon-Louis of Metz, and the plants so obtained are now known as *C.-m. Dardari.* This is represented by the lowest branch in the illustration. (Plate 1).

Crataego-mespilus Asnieresii, *Simon-Louis.*

Issuing from nearly the same place on M. Dardar's tree at Bronvaux was another branch quite unlike the first but also intermediate between hawthorn and medlar. The leaves on this branch were lobed, and the flowers in form and arrangement resembled those of the hawthorn; but the leaves, branchlets and calyx were pubescent, as in the medlar. From this shoot was derived the trees now called *Crataego-mespilus Asnieresii.* The full-page Plate 2 represents the Kew specimen in flower—a tree of great elegance and beauty, and the uppermost spray illustrated on Plate 1 is also of this form. This second graft hybrid leans more towards the hawthorn, whilst *C.-m. Dardari* more resembles the medlar.

Since 1898, *C.-m. Dardari* has shown the same tendency to break up as *Laburnum Adami* has always done, and the three quite distinct flowering branches illustrated on Plate 1 were all gathered from the one Kew specimen on June 1, 1911. The uppermost branch is exactly identical with *C.-m. Asnieresii*, the middle one is pure medlar, and the lowest is *C.-m. Dardari* itself. The bulk of the tree remains true and there is at present only one branch of each of the other two on our tree. The whole phenomenon bears considerable analogy to that exhibited by *Laburnum Adami* except that only one of the parents is reproduced true. So far as I have observed no pure hawthorn has appeared on either *C.-m. Dardari* or *C.-m. Asnieresii.* In fact the specimen of the latter at Kew now figured has hitherto remained quite true to the hybrid type. It is, however, quite probable that it may at any time "sport" as *C.-m. Dardari* has done—may, indeed, have already done so in other gardens. It should also be mentioned that on M. Dardar's mother tree at Bronvaux a third branch appeared beneath the graft, which

1. Crataego-mespilus Dardari.

[*To face page* 268.

2. Crataego-mespilus Asnieresii.

To face page 269.]

at its base was pure hawthorn, but became transformed towards the extremity into what was identical with, or very near to, *C.-m. Asnieresii*.

As an ornamental tree *C.-m. Asnieresii* is much to be recommended, flowering freely and possessing an exceptionally graceful habit. *C.-m. Dardari*, whilst the more interesting in its marked tendency to sport, is not so attractive a tree.

A new interest has been aroused in the study of graft hybrids owing to the recent researches of Professor H. Winkler of Tübingen in grafting the black nightshade (*Solanum nigrum*) on the Tomato (*Lycopersicum esculentum*) and vice versa. The accounts of these experiments have been recently summarised in English by Professor D. H. Campbell*, so that it is unnecessary to refer to them in detail here. It seems clear however that in some cases the hybrids obtained by Winkler were of the nature of "periclinal" hybrids, that is to say, that the outer tissues of the shoot produced by grafting belong to one parent while the inner tissue are those of the other. Macfarlane† in his careful work on the structure of *Laburnum Adami* found that the epidermal tissues were strikingly like those of *C. purpureus* while the inner were like those of the Laburnum, and an investigation of the *Crataego-mespilus* hybrids has revealed a similar state of affairs.

Explanation of Plates.

1. Three sprays gathered from one specimen of *Crataego-mespilus Dardari* at Kew on June 1, 1911 : *C.-m. Asnieresii* (top) ; Medlar, *Mespilus germanica* (middle) ; *C.-m. Dardari* (bottom).

2. *Crataego-mespilus Asnieresii* at Kew, about 10 feet high, photographed June 1, 1911.

XXXVI.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS LXI.

601. **Osbeckia Hildebrandii**, *Stapf* [Melastomaceae-Osbeckieae]; affinis *O. stellatae*, D. Don, sed foliis subtus densius pilosis, bracteis amplis, calycis indumento molli distincta.

Caulis acute quadrangularis, strigulosus. *Folia* ovata vel oblonga, acuta, basi subacuta vel rotundata, 10–20 cm. longa, 3·5–7 cm. lata, herbacea, supra saturate viridia, subadpresse hispidula, infra pallida, in nervis venisque hirta, 7-nervia, nervis venisque transversis admodum prominentibus, margine rigide ciliata, in costa utrinque glandulis purpureis breviter cylindricis vel globosis obsita ; petiolus

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* Campbell, D. H. "The Nature of Graft Hybrids" in The American Naturalist, xlv., January 1911, pp. 41–53 ; *see also* Baur "Einführung in die experimentelle Verebungslehre," pp. 228–245 with figs.

† Macfarlane, J. M. "A comparison of the minute Structures of Plant Hybrids with those of their Parents and its bearing on Biological Problems," Trans. Roy. Soc., Edinburgh, xxxvii., 1895, pp. 203–286.

1–1·6 cm. longus. *Flores* in racemo demum elongato dense hirto-tomentoso, internodiis circiter 6 mm. longis ; bracteae amplae, rotundae, alabastra velantes, dorso adpresse molliterque pilosae, fere 2·5 cm. longae ; pedicelli robusti, 2–4 mm. longi. *Calyx* campanulatus ; tubus sub anthesi 1·4–1·6 cm. longus, squamis appressis albo-hirsutis dense obtectus, squamis inferioribus minutis, summis subulatis purpurascentibus ; lobi e basi latiore lineares, albi, 8 mm. longi. *Petala* rosea, obovato-orbicularia, 2–2·5 cm. longa. *Stamina* aurea ; antherae basi antice et postice brevissime appendiculatae, longe tenuiter rostratae, sigmatoideae, 1·2–1·6 cm. longae, connectivo rubro. *Ovarium* in vertice hirsutum. *Semina* cochleata, 0·6–1 mm. longa, albo-granulata.

Burma. N. Shan States : Toungyi, *Mrs. Hildebrand*, 599–99, cult. Hort. Kew, 1901.

602. **Senecio** (§**Jacobaea**) **lancifer**, *J. R. Drummond* [Compositae-Senecioneae] ; species insignis, propter capitula *S. Jacobaeam*, Linn., necnon *S. sarracenicum*, Linn., revocans, sed ab omnibus *S. Jacobaeae* affinibus foliis omnino haud incisis latis pergamantaceis et phyllariis paucioribus latioribus statim distinguenda.

Herba suffruticosa, 0·4–1·3 m. alta, caule robusto subflexuoso simplici exigue striato laevigato parum folioso. *Folia* radicalia oblongo-lanceolata, basi obliqua, petiolata, caulina pauca, lanceolata vel ovato-lanceolata, subsessilia vel in petiolum brevem manifeste alatum atque auriculatum amplexicaulem decurrentia, omnia obtuse acuminata, margine crenulato-dentata, nervo centrali prominulo infra incrassato, utrinque venis copiosis prominentibus pulchre reticulata, subcoriacea. *Capitula* subcampanulata, diametro 8·5 mm. attingentia, longe radiata, in corymbos 4–6 capitula ferentes longe-pedunculatos bracteis setaceis inconspicuis ornatos disposita, bracteolata ; phyllaria 8–10, aliquando infra subconnata, oblongo-ovata vel subquadrata, obtusissime acuminata, apice subscariosa, colorata, uninervia, cum pedicellis saepius puberula. *Ligulae* ex ungue brevi oblongo-ovatae, apice retusae, obscure dentatae vel sub-integrae, 5–7-striatae, aureae ; disci flosculi infundibuliformes, multo breviores. *Achaenia* cylindrica seu columnaria, supra truncata, subacute costata, glabra, pappo multiseriato albescente undulato satis longo scabro apice minute clavato plumoso donata.

Sikkim. *King's Collector*, 1882. Tibet. King's Collector, 1884 ; Gyangtse, *Walton*, 1904 ; Saogong, *H. M. Stewart*, 20 July, 1907 ; Lhassa, *Waddell*, 1904.

A fine *Senecio* of the *Jacobaea* section, with a twiggy stem, and parchment-like leaves which have the midrib prominent and greatly thickened on the under surface, strongly reticulated with prominent pale veins closely interlaced, but springing from a pinnate series of secondary nerves ; the ultimate projections of the marginal vein-system running out through the lobules of the parenchyma as a blunt mucro ; corymbs long-peduncled from the upper axils, with heads similar in size, colour, &c., to those of *S. Jacobaea*, Linn. ; involucre rather narrow at the base where the phyllaries are often connate ; phyllaries much broadened upwards, with a wide dark-green midrib and pale edges ; achenes rather sharply ribbed, truncate at the summit, at the base contracted, smooth, scarcely compressed, on the disk even ; pappus dull-white, wavy, with the

ends obscurely thickened, finely plumose, or minutely fimbriate. Named from the leaves, which are shaped like a spear-blade, and markedly different from the type which prevails in this section of the genus.

✓ 603. **Senecio** (§ **Ligularia**) **rumicifolius**, *J. R. Drummond* [Compositae-Senecioneae]; species notabilis, maxime ad *S. platyglossum*, Franch., approximans, a quo foliis latioribus obtusioribus, venis magis prominentibus petiolis versus basin inflatis dignoscitur.

Herba annua (?), bipedalis, caule simplici carnoso albescente glabro striato in spicam 20–30 cm. longam plus minus araneosam abeunte. *Folia* [radicalia desunt] inferiora modice petiolata, intermedia petiolis amplexicaulibus versus basin subinflatis ad 17 cm. longis suffulta, in laminam late oblongam basi deltoideo-cordatam apice rotundatam abrupte expansa, ultima sessilia, omnia margine serrato-denticulata, membranacea, venis in pagina inferiore prominulis reticulata, hic illuc araneosa, glabrescentia. *Capitula* anguste campanulata, nutantia, breviter pedunculata, ad 5 cm. elongata, circa 3·8 cm. lata, plus minus araneosa, in racemum arctum subsecundum spiciformem disposita, bracteolis lineari-setaceis longis superne araneoso-villosis extus munita. *Phyllaria* 7–10, obovata, apice obtusa, breviter et obscure mucronata, membranacea, striata. *Ligulae* totidem quot phyllaria, 3·8 cm. longae, ex ungue longo valde angustato in laminam ovato-spathulatam apice rotundatam obtuse 2–3-dentatam productae. *Achaenia* exteriora cymbiformia, costata, aliquando facie interiore canaliculata, interiora glabra subcompressa, omnia cupula manifesta pappum multiseriatum achaenio duplo longiorem candidum minute barbellatum ferente coronata.

Tibet. Yamdokcho, 4570 m., *Walton*.

This somewhat resembles Delavay's No. 3208, and *S. platyglossus*, Franch., but does not altogether match any *Ligularia* at Kew. The breadth and texture of the leaves are remarkable, as well as the almost spicate inflorescence, and the long-clawed ligules. The achenes of the ray are very peculiar, and in some there is a tuft of brown villi at either end of the groove on the inner face, which, if constant, would be a distinctive feature, but the material is insufficient for a decision whether this may not be due to a diseased condition. It is very near *S. platyglossus*, Franchet (in Bull. de Soc. Bot. de France, xxxix, 293), but the heads in the Yunnan plant seem to be smaller, the whole plant, and especially the raceme, far less cobwebby, while the leaves in Capt. Walton's species are broader, more obtuse, and more prominently reticulate, on the under surfaces especially. Neither in the specimen from the Delavay collections, nor in Franchet's description, is there indication of the inflated base of the petiole which is so conspicuous in the Yamdokcho *Ligularia*.

✓ 604. **Senecio** (§ **Synotis**) **pelleifolius**, *King MSS.* ex *J. R. Drummond* [Compositae-Senecioneae]; species e grege *S. quinquelobi*, Hook. f. et Thoms., a *S. Zuccarinii*, Maxim., atque *S. Przewalskii*, Maxim., quibus manifeste affinis, foliorum nervis primariis e costa media cordato-palmatim, nec angulo acuto orti; a *S. quinquelobo* foliis pinnatifidis aliisque notis bene distinguitur.

Herba perennis, glabra vel sparse et minute huc illuc pubescens' radice abbreviata, fibris crebris praedita. *Caulis* simplex, tenuis, erectus, flexuosus, leviter striatus. *Folia* petiolata [radicalia desunt, an marcescentia ?], membranacea, in pagina superiore viridia, scaberula, in inferiore pallida pulchre reticulata, puberula, utrinque venis palmatim editis (pagina inferiore praecipue manifestis) ornata, cordato-deltoidea, pinnatifido-lobata, lobo terminali alte tridentato, lateralibus oblique cuneato-pinnatifidis, lamina circiter 7–6 cm. longa et ad basin idem lata, petiolis foliorum inferiorum ad 5 cm. longis, summorum fere obsoletis, omnia gradatim diminuta. *Capitula* attenuata, cylindraceo-campanulata, circa 1·7 cm. longa, pedicellis brevissimis filiformibus minute bracteolatis sustenta, subsecunda, plus minus nutantia, vel late patentia, circiter 7-flora, secus caulem ad 22·5 cm. vel minus racemose disposita. *Phyllaria* quatuor, ligulato-lanceolata, externe minute puberula, erecta, apicibus paullo recurvatis. *Flosculi* omnes tubulosi, tubo angusto, limbo longe campanulato, pallentes. *Antherae* brevissimae, caudatae, conspicuae. *Achaenia* subcylindracea, satis longa, glabra, pappo candido sericeo minute barbellato donata.

Tibet. Chumbi valley, Tang-shang : at about 3660 m., *Dungboo* ; Do Tho, July 30th, 1877, *King*, 4683.

Sir George King remarks " Amongst the species described in the Fl. Brit. Ind. this would fall between *S. quinquelobus*, Hook. f. and Thoms., and *S. chenopodifolius*, DC. It is also allied to *S. Zuccarinii*, by its deeply palmifid leaves." The inflorescence in *S. Zuccarinii*, Maxim., is very different, except in depauperated examples, but the present plant may be a reduced state of a paniculate form also. From all states of *S. Zuccarinii*, however, as well as from *S. Przewalskii*, Maxim., this is at once distinguished by the venation of the leaves, which in King's species is cordato-palmate, or later broadly sagittate ; in the other two the branches are given off at an acute angle, with a much more widely curved periphery. *S. quinquelobus*, Hook. f. and Thoms., is very close to *S. pelleifolius*, but the heads in the former are more numerous and smaller, the inflorescence more branched and frequently cleistogamous, and the leaves are not pinnatifid. *S. acerifolius*, C. Winkl., which has leaves of a somewhat similar fashion, belongs to a different section of the genus.

605. **Gerbera Lacei**, *Watt* [Compositae — Mutisiaceae] ; affinis *G. macrophyllae*, Benth., sed foliis cordatis lobis basalibus rotundatis facile distinguitur.

Herba perennis, acaulis. *Folia* radicalia, petiolis 4–17·5 cm. longis albo-tomentosis, laminis 5·5–16 cm. longis 3·5–8·5 cm. latis cordato-ovatis vel cordato-oblongis obtusis vel subacutis levissime sinuatis vel minute denticulatis supra glabris subtus albo-tomentosis. *Pedunculi* erecti, 14–60 cm. longi, albo-tomentosi, ebracteati. *Capitulum* solitarium, radiatum, 2·5–3·8 cm. diametro, album. *Involucri* squamae sub-4-seriatae, lanatae, exteriores angustissime linearisubulatae, interiores 1·0–1·6 cm. longae, 1·5–2 mm. latae, lanceolatae, acutissimae, ciliatae. *Flores* radii involucro longiores. *Achaenia* pubescentia. *Pappi* setae scabrae, pallidissime fulvae.

North-West India. Bashahr State : Baturing Forest, in the Baspa valley, 2440 m., *Lace*, 364 ; Nachar Forest, 2590 m., *Lace*, 935. Chamba State : Chitrari Forest, 1800–2130 m., *Lace*, 1712.

606. **Styrax mollis,** *Dunn* [Styracaceae]; affinis *S. confuso*, Hemsl., sed foliis subtus mollibus distincta.

Arbor parva; ramuli teretes, fusci, apice tomentosi. *Folia* alterna, ovata, acuminata vel acuta, basi breviter cuneata, 5–6 cm. longa, 3 cm. lata, crebre obscure glanduloso-serrata, subcoriacea, supra sparse infra dense et molliter stellato-tomentosa, venis primariis 6–7-jugis infra paullo prominentibus, petiolis brevissimis 1–2 mm. longis. *Racemi* in fructu tantum visi, defoliati, ad 14 cm. longi, tomentosi, glabrescentes; pedicelli 1–1·5 cm. longi. *Calyx* late cupulatus, truncatus, obscure dentatus, 5 mm. longus, exigue tomentosus. *Fructus* 1·0–1·2 cm. longus, globosus; pericarpium irregulariter ruptum, crasse coriaceum, tomentosum, in siccitate rugulosum. *Semen* unicum, ellipsoideum, brunneum, rugulosum, hilo latiusculo.

China. Kwangtung: Lo Fou Shan at 270 m., Aug. 11, 1883, Hongkong Herb. 105.

607. **Styrax roseus,** *Dunn* [Styracaceae]; affinis *S. Hemsleyano*, Diels, sed foliis gradatim acuminatis et calycis dentibus minimis differt.

Arbor parva, 2–3 m. alta; rami teretes, fusci, apice puberuli. *Folia* alterna, oblongo-ovata, gradatim acuminata, basi rotundata, 6–9 cm. longa, glanduloso-serrulata, papyracea, praeter venas utrinque pilis albis simplicibus et simul pilis rubris stellatis et praeter eorum axillas barbatas glabra, venis primariis 5-jugis infra paullo prominentibus, petiolis 3–4 mm. longis. *Racemi* axillares, pauciflori, in parte inferiore foliosi, 5–6 cm. longi. *Flores* 2 cm. longi, pedicellis 2–3 mm. longis. *Calyx* cupuliformis, 6–8 mm. altus, margine truncatus, obscure denticulatus, stellato-tomentosus, in parte basali siccitate aurantiacus, papyraceus. *Corolla* 5-partita, tubo 5 mm. longo, lobis valde imbricatis 12 mm. longis roseis 5–6 mm. latis utrinque tomentellis. *Stamina* 10, corollae lobis paullo breviora; antherae marginesque filamentorum pilis stellatis paucis ornatae. *Ovarium* multiovulatum, cum styli basi albo-tomentosum. *Fructus* non visus.

China. Szechuen: Mt. Wu, at 2600 m., *Wilson* 4065.

608. **Aristolochia punjabensis,** *Lace* [Aristolochiaceae]; affinis *A. saccatae*, Wall. var. *dilatatae*, Hook. f., sed foliis minoribus minus elongatis et floribus multo minoribus differt.

Herba volubilis vel procumbens, caule primum retrorso-pubescente demum glabro. *Foliorum* petioli 1–1·8 cm. longi, dense subtomentoso-villosi; laminae 2·5–10 cm. longae, 1·6–5 cm. latae, cordato-ovatae, acutae vel obtusae, utrinque molliter pubescentes. *Flores* axillares, solitarii. *Pedunculi* cum ovariis 2·5–5 cm. longi, breviter villosi, inferne cordato-bracteati. *Calyx* extra subtomentoso-villosus, intra (basi excepta) glaber; tubus 4·6–5 cm. longus, usque ad medium inflatus, deinde abrupte refractus et angustatus; limbus obliquus, 1·8–2 cm. latus, suborbiculatus, obscure 3-lobatus, atropurpureo-venosus. *Stamina* 6, trifasciculata.

North-west India. Chamba State: Bre Forest, 1980 m., *Lace*, 1543; Gothan Forest, 1830 m., *Lace*. Kangra District: Kotharna, 1980 m., *Hart*, 531. Flowering in April and May.

This distinct species is nearest allied to a plant that has hitherto been placed as a variety of *A. saccata*, Wall., which has been

separated below under the name *A. dilatata*, but from which it is abundantly distinct in having smaller and less elongated leaves and flowers only about half as large.

609. **Aristolochia dilatata**, *N. E. Brown* [Aristolochiaceae]; species *A. saccatae*, Wall., affinis, sed floribus axillaribus solitariis differt.

A. saccata, var. *dilatata*, Hook. f., in Fl. Brit. Ind. v, pt. i, p. 77.

North-west India. Kumaon; Ramgunga Valley, 2440 m., *Winterbottom;* Madhari Pass, 2440 m., *Strachey and Winterbottom;* without precise locality, *Blinkworth* (Wall. Cat. 2707 B).

This plant, together with two other species, is included under *A. saccata*, Wall., in the Flora of British India. The true *A. saccata*, Wall., besides having different leaves, produces its flowers in clusters on the old leafless part of the stems, whilst in *A. dilatata* (as in *A. punjabensis*, Lace), they are solitary in the axils of the leaves on the young shoots.

610. **Siphonochilus**, *Wood et Franks*, gen. nov. [Scitamineae-Zingibereae]. Indole *Kaempferiae*, L. praeter flores polygamos monoicos.

Flos ♂ *Kaempferiae. Flos* ♀ : *staminodia* in tubum angustum longum connata, 4–6-lobata; segmenta inaequalia. *Stamina* 0. — Flores *pedunculati, vel brevissime racemosi; pedunculi et ovaria subterranea.*

Siphonochilus natalensis, *Wood et Franks* (species unica). *Herba* perennis. *Rhizoma* subglobosum, 4–8 cm. diametro, aromaticum; radices filiformes. *Caulis* foliosus, 6–8 cm. altus. *Folia* 5–10; petioli vaginati, caulem spurium reddentes; laminae lanceolatae, medio amplissimae, 30–35 cm. longae, 6–9 cm. latae, demissimae 7–9 cm. longae, 2–3 cm. latae, costa subtus prominente. *Flores* 3–6, speciosi, e rhizomate orti, pedunculati, solitarii vel brevissime racemosi, basi bracteati; bracteae oblongae, obtusae, 2–3 cm. longae, 0·8–1·5 cm. latae; pedicelli 1·2–2·5 cm. longi; pedunculi, bracteae, pedicelli et ovaria subterranea. *Flos hermaphroditus: Calyx* tubulosus, tridentatus, membranaceus, albus, 2·5–3 cm. longus, triente superiore unilateraliter fissus. *Corollae* tubus 2–2·5 cm. longus; lobi 3, lanceolati, acuminati, 6·5 cm. longi, 1·5 cm. lati, membranacei, albi. *Staminodia* petaloidea, rosea, amplissima; labellum cum staminodiis 2 erectis lateralibus 5 cm. longis 3·75 cm. latis in tubum fissum 6·5 cm. longum connatum, bifidum, 5·5 cm. longum et latum. *Stamen* 5 cm. longum; anthera linearis, 2-locularis, 1·2 cm. longa, connectivo ultra loculos in cristam dentatam 2–3 cm. longam 1–1·2 cm. latam producto. *Ovarium* 3-loculare, loculis ∞ ovulatis; stylus filiformis; stigma ultra loculos antherae crateriforme, apice 3-lobatum. *Flos foemineus: Calyx* et corolla florum hermaphroditorum. *Staminodia* in tubum cylindricum 8 cm. longum connata, 5–6-lobata; segmenta 4–6, inaequalia, 2–3 oblonga, obtusa, 5–6 cm. longa, 2·5–3 cm. lata, alterna 2–3 angusta, 5–6 cm. longa, 0·8–1 cm. lata. *Stamen* 0. *Pistillum* floris hermaphroditi.

Natal. Inanda, 540 m., *J. Medley Wood*, 544; Zululand, 'Ngoya, 450–610 m., *Wood*, 11,723.

Brought from 'Ngoya by the Curator, Mr. Wylie, and flowered in the Botanic Gardens, Durban, in December, 1910.

This genus differs from *Kaempferia* by its polygamous flowers, and from all species of *Kaempferia*,—*K. Ethelae*, J. M. Wood, only excepted—by the ovaries being beneath the surface of the ground. A large number of the plants have been under observation during the flowering season, but very few perfect flowers have been noted, the female flowers largely outnumbering them, and in no case so far as we have been able to find, have seeds been produced, the ovaries rotting in the ground, though the flowers are visited by a minute "Mucid" fly, the name of which we have not been able to ascertain. The tube of the female flowers is very narrow and long, so that fertilisation can only be effected by a very minute insect, and the flowers only remain open for the first half of the day, being completely closed before the evening. The late Mr. W. T. Gerrard, who first collected this plant, noted that the flowers were unisexual (Botanical Magazine, t. 5994). The plant was afterwards named by Dr. Schlechter from Wood's 544, and was by him and K. Schumann named *Kaempferia natalensis*, and they stated that if male flowers had been seen they would have proposed to "give it the dignity of a new genus," for which they suggested the name *Siphonochilus*. That name we have retained, though no male flowers have been seen, female and perfect ones only.

XXXVII.—MISCELLANEOUS NOTES.

Mr. H. N. Ridley.—We note with pleasure, in the list of Coronation Honours that Mr. H. N. Ridley, F.R.S., Director of the Botanic Gardens, Singapore, has been appointed a Companion of the Most Distinguished Order of Saint Michael and Saint George.

Dr. Harry Bolus, the doyen of students and collectors of the rich flora of Cape Colony, died of heart failure at the age of 77 on Thursday, May 25th, at Oxted in Surrey. He was born at Nottingham in April, 1834, and went out to the Cape at the age of 16. At first he settled at Graaff Reinet in the very centre of the colony, but about 1874 he removed to Cape Town and took up his residence in the suburb Kenilworth. By energy and perseverance Dr. Bolus accumulated a large fortune and has been a liberal patron of botany and education. He founded the Bolus Professorship of Botany in the South African University at Cape Town, of which the first and present occupant is Dr. H. H. W. Pearson. By the terms of his will £48,000 will ultimately fall to the University for scholarships and similar purposes. It is also understood that his valuable herbarium and rich library is left conditionally to the South African College to be in charge of his niece, Miss Louisa Kensit, who of late years has devoted herself to Botany and worked entirely with Dr. Bolus in all his botanical researches.

Shortly after taking up his residence at Graaff Reinet he became acquainted with Mr. Tuck, Professor MacOwan and Professor Guthrie. While at Graaff Reinet he took a great interest in succulent and bulbous plants and sent many of them alive to Kew.

Originally his only European botanical correspondent was Dr. Harvey, but after the death of the latter he commenced to correspond (in 1867) with Kew and continued this correspondence during the whole of his botanical career. His first visit to the Royal Botanic Gardens was made in the summer of 1876, when he brought a large collection of Cape plants for comparison with the Kew material. He gave duplicates of almost all he brought to Kew. These duplicates are now practically all that remain of that collection, for on his return to Cape Town in the "Windsor Castle" the ship was wrecked in Table Bay and he lost all his specimens, and the fruits of his visit were wasted. This was a great disappointment to him, but it did not damp his enthusiasm. The above was not the only accident that befell him, for on one occasion, during his absence from home, his entire herbarium ran the risk of being destroyed by fire, but owing to the devotion of his wife his herbarium and library were saved from the flames.

Dr. Bolus did a large amount of botanical work, principally on the Heaths and Orchids of the Cape. He elaborated the Heaths, with the help of his friend Dr. Guthrie, for the fourth volume of the Flora Capensis. This was a very difficult task, as the species number nearly 5,000 and many of them have been hybridised in gardens and a great many of the older descriptions are very incomplete. The death of his friend Dr. Guthrie, while collaborating in this work, was very keenly felt by Dr. Bolus.

About the year 1878 he commenced work on the Cape Orchids as a special study and for these he rapidly developed a great and lasting interest. At the commencement he found great difficulty in their determination, so with a view to assisting himself and others, when he again visited Kew in 1881, he prepared a list of South African Orchids with references which was published in Journ. Linn. Soc. in 1882, vol. 19, p. 335. Of the Orchids found in the vicinity of Cape Town he soon commenced to make drawings from the living plants, with a view to their ultimate publication, an idea that was realised by the publication of his "Cape Orchids" in 1888, containing 36 coloured plates, followed in 1893 and 1903 by parts 1 and 2 of his "Orchids of South Africa," each containing 50 plates. A third part containing 100 figures and descriptions has just appeared, the final proof being corrected by him the day before his death. He has left figures and descriptions of 75 more species, which it is to be hoped will be published before long.

In 1884 Dr. Bolus and Professor MacOwan commenced to issue their "Herbarium Normale Austro-Africanum," of which the advance sets were sent to Kew for correct determination before being issued to other herbaria, this practice being discontinued after the issue of the first 1000 numbers. About 1893, owing to some difference of opinion MacOwan continued the issue, unaided, under the title of Herbarium Austro-Africanum. These valuable sets were presented free to the six principal European and American herbaria.

In 1870 the Surveyor General of the Cape published an excellent map of Cape Colony. Some years after Dr. Bolus published an edition of this dividing out the country into botanical districts.

These districts were adopted with slight modifications in the continuation of Harvey & Sonder's Flora Capensis, edited by Sir W. T. Thiselton-Dyer and still in progress. In 1886 he contributed to the official handbook a "Sketch of the Flora of South Africa," and in 1905 he published an amended "Sketch of the Floral Regions of South Africa." In 1903 Dr. Bolus drew up in collaboration with Major Wolley-Dod an annotated list of the plants of the Cape Peninsula, the flora of which is extremely rich. In 1873 Dr. Bolus was elected a Fellow of the Linnean Society. The University of South Africa conferred the honorary degree of D.Sc. on him in recognition of his scientific work and of his liberality in endowing the Professorship. His name has been commemorated by Mr. Bentham in the genus *Bolusia* of the tribe *Galegae* in *Leguminosae*, and many species have also been named in his honour, including *Drimia Bolusii*, *Haworthia Bolusii*, *Cheilanthes Bolusii*.

His remains were interred after a very simple service, according to his wishes, in the Oxted churchyard.

The following letter received by the Director from Professor Pearson expresses the esteem in which Dr. Bolus was held in South Africa :—

"The news of the death of Dr. Bolus, which came by cable on Friday, has very much shocked his friends here. When I saw him off at the docks, a month ago, he told me that he felt he might never return. But that he should have died so shortly after his arrival in England, I suppose before he had time to see many of his friends, is particularly sad. I have felt for some time that he was becoming unattached to this country, and, in fact within the last two years he had frequently talked of the possibility of returning to end his life in England.

"He has done a wonderful work here, and his loss will be severely felt, and not merely among the few who are interested in Botany. His influence was very much greater than he realised, and it would be very difficult to define its nature. He took very little active part in public affairs of any kind, and even in matters in which the mere expression of his opinion would carry great weight, it was sometimes difficult (especially in recent years) to persuade him to support a cause in which he felt keenly interested. I think he was known chiefly through a few of his published writings—"The Orchids and the Heaths" more particularly—and through his letters, for he had a great number of correspondents at one time or another. His name was known from one end of the country to the other. As a man of business he was known for his strict integrity ; as a botanist his enthusiasm and energy and his willingness to help the many isolated workers who kept in touch with him have done, perhaps, more than anything else to establish Botany in this country. To me he has been the kindest of friends ever since I came here. All that he stood for in the country, especially with respect to the science he has made so signally his own, we shall not know until we have learned what it is to do without him."

Presentation by Mrs. Beddome.—Mrs. Beddome has very kindly presented to Kew the collection of dried Ferns, and Fern allies made by the late Colonel Beddome in India. The collection contains the material collected by him in Southern India, and that sent to him by various correspondents in other parts of India in connection with his well known works on "Indian Ferns." The presentation of Colonel Beddome's herbarium makes a valuable addition to the Kew collections.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin :—

Sir John Stirling Maxwell, Bart., Pollokshaws, N.B.—Plants of young Sitka Spruce (*Picea sitchensis*) and of *Pinus montana*, var. *uncinata* grown at an elevation of 800 feet. These were forwarded to illustrate the advantages of planting on raised turves on boggy land. Other plants were also received of the same species grown on unprepared land, together with photographs bearing upon the subject. (See *K. B.* No. 5, 1911, pp. 226–228).

The Agent-General for Western Australia.—Log of Jarrah (*Eucalyptus marginata*) from Western Australia. This has been placed in position in the Timber Museum (No. 3).

Mr. H. B. Rogers, Hexworthy, Launceston.—Specimens and photographs of *Cupressus Lawsoniana* and *Thuja plicata*, showing injury caused by squirrels.

Rev. Canon Ellacombe, Bitton Vicarage, Bristol.—Illustrations of varieties of Citrus fruits and of Persimmons (*Diospyros Kaki*) cultivated in Japan.

Prof. Bayley Balfour, F.R.S., Royal Botanic Gardens, Edinburgh.—Rope made of fibre of *Apocynum Hendersonii.*

Botanic Gardens, Singapore.—Fasciated stem of *Martinezia caryotaefolia.* Horned Cocoanuts. Branching stem of *Chrysalidocarpus lutescens.* Section of stem of *Hevea brasiliensis* showing healing of wounds caused by tapping for rubber. Branch of *Eugenia grandis* attacked by *Loranthus pentandrus.* Portion of stem of *Thunbergia laurifolia.*

Dr. C. S. Dolley, Mexico, per Sir Reginald Tower.—Stems of "Jumete," "Canelillo" or "Candelillo" (*Pedilanthus pavonis*) from Culiacán, Sinaloa, Mexico ; of "Cordoban" (*Pedilanthus tomentellus*) Tehuacan, Puebla, Mexico, and of "Candelilla" (*Euphorbia antisiphylitica*) from Coahuila, Mexico.

Sir W. S. Church, Bart., Harley Street, London.—Two sections of the trunk of an Oak, showing abnormal development.

The Right Honourable the Earl of Essex, Cassiobury Park, Watford.—Sections of the trunk of *Gymnocladus canadensis.*

The Right Honourable the Earl of Darnley, Cobham Hall, near Gravesend.—Sections of timber of Ash, Elm, Sweet Chestnut, Hornbeam, Deodar, Tulip tree, and of Cluster or Maritime Pine.

Miss Cleghorn, Calcutta.—Photograph of a branching Date Palm (*Phoenix sylvestris*).

Mr. A. D. Cotton, Kew.—Specimens of *Colpomenia sinuosa*, collected at Studland. This is a Mediterranean Seaweed, first observed on British Shores in 1905.

Messrs. Adolf Bleichert & Co., Bishopsgate Street, London.—Series of photographs to illustrate the transport of timber by means of aerial ropeways.

Mr. P. Masson, Edgeworth, Belvedere.—Photograph of Balsam Poplar with aerial roots.

Miss Webb, Stroud Road, Gloucester.—Skeletonised leaves of Poplar.

Mr. W. R. E. Coles, Adelaide Buildings, London Bridge.—Section of wood of *Platanus acerifolia* from a tree which was blown down in the churchyard of St. Michael, Crooked Lane, London.

Messrs. Paul Walser & Co., Ltd., Cripplegate Buildings, London.—Collection of materials of vegetable origin employed in millinery.

Messrs. Trewhella Bros., Smethwick, Birmingham.—Australian Monkey Jack used in tree felling.

Mr. E. Percy Rogers, Brampton Bryant, Herefordshire.—Shoots of Douglas Fir injured by caterpillars which had migrated from oak.

J. M. H.

Botanical Magazine for June.—The plants figured are *Cattleya Rex*, O'Brien (t. 8377); *Columnea gloriosa*, Sprague (t. 8387); *Prostanthera pulchella*, Skan (t. 8379); *Pteronia incana*, DC. (t. 8380); and *Saussurea Veitchiana*, Drummond and Hutchinson (t. 8381).

The *Cattleya*, a handsome species with white perianth and crimson and orange-red labellum, was discovered by Mr. Bugeroth, in the Peruvian Andes, and introduced to cultivation by Mr. L. Linden, of Brussels. The plant figured, which flowered at Kew, was purchased from Messrs. Sander and Sons, St. Albans, who recently obtained a fresh consignment of plants from Moyobamba. It is most nearly allied to *C. maxima*, Lindl.

Columnea gloriosa is a remarkably fine species, with its large, widely-open, scarlet flowers. It is a native of Costa Rica, and the plant from which the figure was drawn was purchased in 1909 from Messrs. Haage and Schmidt, of Erfurt. It is most nearly allied to *C. microcalyx*, Hanst., but is readily distinguished by its spreading calyx and the hairy, convex leaves from all other species in cultivation.

The *Prostanthera* was presented to Kew by Mr. T. A. Dorrien-Smith, of Tresco Abbey, Isles of Scilly, in 1908, and we owe its introduction to Capt. A. A. Dorrien-Smith, who brought the plants with him from the Antipodes. It is a native of Australia, and a distinct, hitherto undescribed species which does not readily fall into any of the sections of this large genus. The small violet flowers and *Boronia*-like habit make it a worthy subject for cultivation in a cool house.

Pteronia incana is a small grey-leaved glutinous South African shrub. The yellow flowers are borne in small axilliary capitula, and

are deliciously perfumed like mignonette. In the gardens of the Riviera it is a favourite plant, and the subject of the illustration was sent to Kew by Lady Hanbury, from La Mortola, Ventimiglia.

Saussurea Veitchiana is a striking plant, introduced to cultivation by Mr. E. H. Wilson, when collecting for Messrs. J. Veitch and Sons. Plants were raised from the seeds collected at Fang in Central China, and from one of these, presented to the Royal Botanic Gardens, Glasnevin, in December, 1904, came the material from which the plate is prepared. The flowers are a dull ruddy purple, a colour assumed also by the upper bracts, and the closest ally to this plant is *S. iodostegia*, which shows the same character in its bracts.

New Zealand Plants.*—To all those interested in the Flora of New Zealand, we would commend Dr. Cockayne's little book. He has succeeded in producing a popular work on scientific lines which should be of great value to lovers of nature and botanists, not only in New Zealand, but also in this country. The illustrations alone render the book a valuable addition to the botanist's library. The opening chapter deals shortly with general considerations of New Zealand as a biological region, and of the relations of its flora to South America and Australia. This is followed by a short account of the botanical history and chapters on the forests, shrubberies, coast vegetation, meadows, &c.

An account of the naturalised plants, numbering some 530 species, forms one of the most useful portions of the book. In the concluding chapters the story of some of the common New Zealand plants is told and makes very interesting reading, and lastly suggestions for the cultivation of the New Zealand plants are given which, in connection with the rest of the book, should do much to stir up enthusiasm in the country for the creation of gardens of native rather than of introduced plants. In this chapter (p. 168) he sums up the essence of scientific gardening so well that we quote it verbatim :—

"It must have been seen by the reader that one particular species may grow in most diverse stations, and that another may grow in a wet place which is physiologically dry. For instance, because a plant grows in a sphagnum bog, it would not necessarily be wise to plant it in a very wet part of the garden. To attempt to grow the lovely *Olearia semidentata*, of the Chathams, in such a place, would be to court disaster ; it must be grown in well-drained ground where there is good shelter. Nor because the great forget-me-not, of the same group, is a sea-shore plant, need one despair to cultivate it inland. In short, an aquaintance with natural conditions combined with experimental planting is a necessity for a full knowledge as to the cultural requirements of our plants."

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* New Zealand Plants and their Story, by L. Cockayne, pp. 176, illustrated with 71 photographs. Wellington, 1910.

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Strychnos Ignatii, Berg

***To face page* 281.]**

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 7. 1911

XXXVIII.—STRYCHNOS IGNATII AND OTHER EAST INDIAN AND PHILIPPINE SPECIES OF STRYCHNOS.

(With Plates.)

An account of *Strychnos Ignatii* was published in Hooker's Icones, t. 2212, April, 1892, based on material collected in Samar and Mindanao, Philippine Islands, by Boxall in 1891. Owing to a statement by the collector that there is another species of *Strychnos*, known as St. Ignatius' bean, which is much more plentiful than the plant figured, and that it is the seeds of this species which are exported as St. Ignatius' beans, some uncertainty exists as to the identity of the true *Strychnos Ignatii*.

This uncertainty is increased when the description and figure given by Vidal* are examined, as his plant though depicted with large fruits and seeds is very different from Boxall's both in floral and in foliage characters.

With the kind help of Mr. Elmer D. Merrill, Botanist of the Bureau of Science, Manila, numerous attempts have been made during the past three years to discover whether or not the plant collected by Boxall is the true source of St. Ignatius' beans† and what may be the plant figured by Vidal.

Mr. Merrill has enlisted the help of several collectors in the Philippine Islands, and has also forwarded all the *Strychnos* specimens from the Herbarium of the Bureau of Science to Kew. Mr. Lyon has also kindly sent over specimens and information, but unfortunately there still exist lacunae in our knowledge.

The question as to the exact identity of *S. Ignatii* remains to some extent an open one owing to the collection of a specimen by Mr. Guerrero, which has not reached England and about which

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* Revision de Plant. Vasc. Filip. (1886), p. 450.

† The name "Fava de Ignacio" has been applied to plants other than *Strychnos*. *Pterodon pubescens* from Brazil, and other species of this genus as well as the seeds of *Fevillea trilobata* are known by this name, but they appear to have no medicinal use. The name has also been applied to *Anisosperma Passiflora*, Mans., according to Lindley, Vegetable Kingdom, p. 315, and the seeds of one of the *Dalbergiae* (*Leguminosae*) have been sent to Kew under the name of "Ignatia Amara" beans, *see K.B.*, 1898, pp. 103–104.

(20866—6a.) Wt. 118—9, 1125, 9/11. D & S.

Mr. Merrill wrote in May, 1910, as follows :—"Mr. Guerrero brought in a single leaf and detached inflorescence of what is almost certainly *S. multiflora*, Benth., also from Catbalogan [Samar], and his information regarding it was that it also had large fruits that contained poisonous seeds; the inference is that there are two species that produce the seeds that enter commerce as *Strychnos Ignatii*, Berg." Vidal's drawings closely resemble *Strychnos multiflora*, the common species in the island of Luzon, except as regards the fruits, and some specimens sent by Lyon from Mindanao with leaves and flower buds only, closely resembling the plant figured by Vidal, were thought at one time to represent the missing plant. An examination of the Philippine Herbarium material, however, has led to a further complication since it is now certain that *S. multiflora* occurs not only in Mindanao but also as far south as Ceram, and it is probable, therefore, that it is distributed through the Archipelago. Specimens with both flowers and fruits have been examined which belong to perfectly typical *S. multiflora*, and Lyon's plant no doubt belongs to this species. As yet therefore no definite clue as to the identity of Guerrero's plant has been received.

Two other species allied to *S. multiflora* have also been recognised in the material sent for examination from Mindanao, but in neither case have fruits been seen. They have been described under the names *S. lanata*, A. W. Hill, and *S. dubia*, A. W. Hill. The former of these has leaves very similar to those of *S. multiflora*, and it is just possible that it may be the long-desired plant mentioned by Boxall and Guerrero. In the hairy character of the short-tubed corolla *S. lanata* also shews some resemblance to the picture of *S. Ignatii* given by Vidal. A Bornean species, *S. polytrichantha*, Gilg, with a large globular fruit and short-tubed hairy corolla, resembles *S. lanata* from the Philippines, and it is possible, if this resemblance indicates any real affinity, that *S. lanata* may also have a large fruit containing seeds like those of *S. Ignatii*. Unfortunately, however, this must remain mere conjecture until more evidence has been obtained from the Philippines, so that we must still await the explanation of the statements made by Boxall and Guerrero.

Considerable difficulty attaches to the collection of specimens of *Strychnos*, since flowers and ripe fruits are never found at the same time, and unless particular vines are definitely marked, it is possible that a flowering specimen may belong to one species, and a fruiting specimen to another, although the foliage characters may be very similar. If, however, it should ultimately transpire that two distinct plants yield the St. Ignatius' beans of commerce it would appear, judging from the numerous samples received, that the fruits and seeds must show a very close superficial resemblance.

In attempting to review the evidence and material relating to *S. Ignatii*, it has been necessary to examine and revise as fully as possible the available material from the Philippine Islands and adjacent regions, and to compare it with the material from the Malay Peninsula dealt with by Gamble in "Materials for a Flora of the Malayan Peninsula." Through the kindness of the Director of the Rijks Herbarium at Leiden, the Director of the Herbarium of the Rijks-Universiteit, Utrecht, and the Director of the Botanic Gardens, Buitenzorg, it has been possible

to see the best available material of *Strychnos* from the Dutch East Indies, and to compare these specimens with those preserved at Kew and the British Museum.

Some twenty-four species are enumerated some of which are described as new; a key is given and the geographical distribution of the various species is set out.

Many of the specimens, however, are in an unsatisfactory condition, very few possessing fruits or seeds, and in several cases they consist only of stems and leaves.

A good deal of confusion has been caused in some cases by the somewhat hasty reference of a specimen to a definite species on insufficient material or without consulting the type specimens. Thus the very distinct species (*S. ligustrina*, Bl.) from the Island of Timor, though described and beautifully figured by Blume, has been referred to *S. Nux-vomica*, and a distinct Malayan species (*S. pseudo-tieutê*, A. W. Hill) with a long tubular corolla and large fruits has been referred to *S. Tieuté* from Java. The Fijian *Strychnos*, which up till now has been referred to *S. colubrina*, Linn., has been found to be quite distinct, and has been described as a new species, *S. vitiensis*, A. W. Hill, and other instances might be quoted.

The species of *Strychnos* from the East Indies fall into two groups, one of which appears to be a very natural one, and the other is rather a matter of convenience than a representation of definite affinity. In the first group the species are distinguished by the elongated corollas with long corolla tubes, and large globular thick-shelled fruits containing several, hard, hairy seeds. With the exception possibly of *S. ligustrina* from Timor, the species in this group appear to be very closely related to each other.

Dop in his recent memoir* enumerates seven species with long tubular corollas. Two species from Indo-China are new, namely, *S. rupicola*, Pierre, and *S. spireana*, Dop, and the others are *S. Tieuté* (=*S. pseudo-tieuté*, A. W. Hill), *S. Gauthierana*, Pierre, *S. potatorum*, *S. Nux-vomica*, and *S. Wallichiana*. It is doubtful whether *S. Nux-vomica* is known from the East Indian Islands.

The group with the corolla tube equal to or shorter than the lobes certainly includes more than one sub-group and some isolated forms. The affinities of these different species are discussed in the course of this paper, but it may be mentioned here that some of the groupings appear to be distinctly geographical, such as the *S. multiflora* group in the Philippines, which includes *S. luzonensis*, *S. dubia*, *S. lanata*, *S. ovata*, and *S. Merrillii*, but as the specimens are often so imperfect, it is not safe to discuss relationships in detail without knowledge of the fruits and seeds.

From the list of species which follows it will be seen that the Philippine Islands possess the largest number of species, and Borneo comes next on the list. In the case of Borneo and New Guinea, however, we have probably much to learn, for among the specimens sent to Kew from Buitenzorg there are five specimens, collected by Nieuwenhuis in Central Borneo, only one of which can be named as they are represented by leaves only. Two or three

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* Contribution a l'étude des Loganiacées Asiatiques de l'herbier du Museum de Paris, Bull. Soc. Bot. Fr. 1910, ser. 4, x. mem. 19.

of them appear to belong to undescribed and unknown species, and of these specimens two shew some resemblance to *S. multiflora* in foliage characters.

The different species of *Strychnos* appear on the whole to be confined to a particular island or group of adjacent islands, though with allied species a fairly wide geographical area may be covered. *S. multiflora* and its near allies appear to be entirely Philippine; *S. polytrichantha*, a distinct form, is not known outside Borneo; *S. ligustrina* is a native of Timor, and has a close ally or varietal form, *S. lucida*, on the adjacent coast of Northern Australia, and is probably represented by a varietal form in Java; *S. Ignatii* to a few islands of the Philippine group and so on. Other species, however, have a more extended range, and may occur on the mainland. Thus *S. pubescens*, which is found in Borneo, is widely distributed in Malaya and, with *S. axillaris* from the Khasia Hills and *S. Ridleyi* from Malaya, shows close affinity to *S. Horsfieldiana* from Java and *S. palembanica* from Sumatra. *S. laurina*, a Burmese and Malayan species, has been collected in Java, but the specimens appear to have been derived from cultivated plants. *S. acuminata* may also be represented in Borneo, though the latter identification is uncertain.

The most interesting case of distribution is afforded by the species with long corolla tubes, namely *S. pseudo-tieuté* in Malaya, *S. Gauthierana* in Indo-China, *S. Tieuté* in Java, *S. Beccarii* and *S. cuspidata* in Borneo, and *S. Ignatii* in the Philippines. All these species have large fruits with seeds containing strychnine (? *S. cuspidata*), and there can be no doubt that they represent a very natural group. It may be that the presence of these allied species in the various islands and the adjoining mainland is due either to distribution by birds or human agency at some remote period, or to modification of a single species during a long period of isolation.

Geographical Distribution of the East Indian species of Strychnos.

Malaya.

S. pseudo-tieuté.
S. pubescens.
S. laurina.

Sumatra.

S. palembanica.
S. lanceolaris.

Java.

S. palembanica.
S. Horsfieldiana.
S. laurina.
S. maxima (?).
S. Tieuté.
S. ligustrina (?).
S. laurina (? cult.).

Celebes.

S. sp. (near *S. ovata* ?).

Tonkin, Indo-China.

S. Gauthierana.
S. pubescens.
and other species.

Borneo.

S. pubescens.
S. polytrichantha.
S. Beccarii.
S. cuspidata.
S. acuminata (?).
and other unknown species.

Philippine Islands.

S. multiflora. Luzon and other islands.
S. luzonensis } Luzon only.
S. Merrillii }
S. ovata }
S. lanata } Islands other than Luzon.
S. dubia }
S. Ignatii }

New Guinea.

S. Forbesii.
S. barbata.
S. Kierstingii.

Timor.

S. ligustrina.

Australia, N. Coast.

S. lucida (closely allied to *S. ligustrina*).

Ceram.

S. multiflora.

North Queensland.

S. Bancroftiana (= *S. multiflora* ?).

Fiji Islands.

S. vitiensis.

Clavis specierum.

Corollae tubus elongatus lobis duplo longior.
Corollae tubus intus glaber.
Folia trinervia parva ovata 3–4 cm. longa *S. ligustrina.*
Folia subtriplinervia elliptica vel elliptico-ovata 5·5–8 cm. longa ... ... *S. pseudo-tieuté.*
Corollae tubus intus versus basin plus minusve hirsutus.
Folia trinervia.
Folia elliptica abrupte elongato-acuminata *S. cuspidata.*
Folia ovata abrupte acuta nervis lateralibus basi curvatis ... ... *S. Gauthierana.*
Folia elliptica vel elliptico-ovata abrupte acuta nervis basi cuneatis ... ... *S. Ignatii.*
Folia subtriplinervia.
Folia ovata elongato-acuminata coriacea nervis basi curvatis ... ... *S. Beccarii.*
Folia elliptica acuminata subcoriacea nervis basi cuneatis ... ... *S. Tieuté.*
Corollae tubus lobis paullo longior vel brevior; corolla 2–3·5 mm. longa.
Corollae lobi medio linea pilorum notati.
Folia ovata vel elliptico-ovata basi rotundata vel rotundato-cuneata.
Folia superne et inferne pubescentes, tomento ferrugineo conspicue instructa ... *S. pubescens.*
Folia inferne in costae angulis et costis pubescentes, superne costa basi excepta glabra, tomentum inconspicuum ... ... *S. palembanica.*
Folia ovato- vel elliptico-lanceolata basi abrupte cuneata *S. Horsfieldiana*

Corollae tubus lobis paullo longior vel brevior ; corolla 2–3·5 mm. longa—*cont.*
Corollae lobi glabri vel subglabri.
Antherae basi retrorso-villosae.
Folia trinervia vel paullo triplinervia, ovarium parce hirsutum.
Folia 14–20 cm. longa 6–7·5 cm. lata, 5-nervia *S. Forbesii.*
Folia 10–12 cm. longa 3–4·5 cm. lata, 3-nervia *S. acuminata* (*?*).
Folia triplinervia, ovarium glabrum *S. vitiensis.*
Antherae glabrae.
Folia trinervia... ... ... *S. ovata.*
Folia triplinervia.
Corollae tubus glaber.
Inflorescentiae axillares, folia ovato-lanceolata circiter 7 cm. longa... ... *S. lanceolaris.*
Inflorescentiae terminales, folia ovata circiter 11 cm. longa ... ... *S. villosa.*
Corollae tubus hirsutus.
Corollae tubus lobis aequilongis, ovarium glabrum *S. luzonensis.*
Corollae tubus lobis brevior, ovarium hirsutum *S. Merrillii.*

Corollae tubus lobis paullo longior vel aequilongis ; corolla 4·5–11 mm. longa.
Antherae basi retrorso-villosae.
Inflorescentiae paniculatae longe pedunculatae, folia conspicue triplinervia ... ... *S. barbata.*
Inflorescentiae breviter pedunculatae, folia paullo triplinervia ... ... *S. laurina.*
Antherae glabrae.
Folia trinervia vel paullo triplinervia.
Corollae lobi tomentosi, stylus hirsutus *S. polytrichantha.*
Corollae lobi glabri, stylus glaber *S. dubia.*
Folia triplinervia.
Corollae lobi tomentosi, stylus hirsutus *S. lanata.*
Corollae lobi glabri, stylus glaber *S. multiflora.*

Species non satis notae.

S. acuminata.
S. monosperma.
S. Kerstingii.

Strychnos ligustrina, *Bl.* in Rumphia 1, p. 68, t. 25 ; Rumph. Amb. 2, p. 121, t. 38 ; Mal. Breyn. Ic. 19, t. 5, f. 2 ; A.DC. in DC. Prodr. ix., p. 15.

S. Nux-vomica, Benth., quoad syn. in Journ. Linn. Soc. i, p. 103, non Linn. Cf. etiam, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv., p. 90, in adnot. *S. Nux-vomicae. S. Nux-vomica, L.* β. *depauperata,*

Miq. Flor. Ned. Ind. ii., p. 378 (?). *Strychnos colubrina*, auct. plur. non Linn. nec Wight nec Van Roy. *S. muricata*, Kostel in Miq. Flor. Ned. Ind. ii., p. 380, DC. Prodr., ix., p. 15.

TIMOR. Spanoghe: Kajve Oelar (19, 911. 32); Timor (*Mappa ligustrina*), *Zippel*; *Zippel*, 52; (*Melicope ternata*, Forst.) *Herb. Zipp.*; Timor, *Teysmann*, 8969 (with fruit); Coepang, *R. Brown* (Ap. 1803), in Herb. Mus. Brit.

JAVA. A specimen from the Island of Madura, in Herb. Lugd. Bat. collected by De Vriese, with leaves only, resembles the species from Timor and may belong to this species.

There is a specimen at Kew from the Buitenzorg gardens labelled *S. ligustrina*, Bl., and also *S. Nux-vomica*, L., and another collected by Horsfield—labelled *S. maxima*, L. *forma*—at Bidar pait, Java (240), which both agree with a large leaf-bearing specimen at Utrecht labelled *S. Nux-vomica*, L. var. *minor* (*S. ligustrina*, Bl.), collected at Bidura pait, Java. None of these specimens bear flowers, the leaves, however, which are broadly ovate, acute, are grey on the under surface like those of *S. ligustrina*, and only differ in being rather more herbaceous and larger. It is possible, therefore, that *S. ligustrina* occurs in Java as well as in Timor, though as in the case of *S. lucida* from Australia, the Javan form is somewhat different from the type.

This species is a distinct and well-marked form. It was reduced to *S. Nux-vomica*, Linn., by Bentham in Journ. Linn. Soc., i., p. 103 (see also Flor. Brit. Ind., iv., p. 90, in note), but is not really closely allied to that species. It differs from *S. Nux-vomica* in the consistently small leaves, the broadly triangular acute calyx segments, the glabrous corolla tube, the shorter sagittate anthers with longer filaments, the smaller fruits, and the smaller seeds, which are not always of the familiar depressed circular form. According to Blume, the seeds of this species are used as a source of strychnine, and are the equivalent of *S. Nux-vomica* in this respect.

S. ligustrina does not appear to be closely allied to any other East Indian species, but in general appearance it is similar to *S. angustiflora*, Benth., from Hong Kong. There are, however, well marked differences in foliage and floral characters, but the fruits of *S. angustiflora*, with their thin shells enclosing a button-like seed covered with satiny hairs, are very like those of *S. ligustrina*.

S. lucida, *R. Br.* Prod., p. 469; DC. Prodr., ix., p. 16; Benth. Flor. Aust., iv., p. 369, from the north-western Coast of Australia, near Port Darwin, is very closely allied to *S. ligustrina*, and should perhaps rather be regarded as a variety. The leaves are larger and more coriaceous, and the fruits appear to be smaller. It is possible that the Australian plants have been derived in the past from seeds from Timor, brought over either by birds or by natives. No other *Strychnos* in Australia shows any resemblance to this plant.

Strychnos pseudo-tieuté, *A. W. Hill*: species *S. Beccarii*, Gilg, valde affinis sed foliis ellipticis basi acutis floribus minoribus corollis intus glabris antheris brevioribus distinguenda.

Frutex scandens, ramis ramulisque firmis griseo-brunneis, cirris singulis circinatis lignosis. *Folia* subcoriacea, superne vernicosa vel nitentia, elliptica vel elliptico-ovata, apice caudato-acuminata,

basi acuta vel rarius rotundata, 5·5–8·5 cm. longa, 2·8–4 cm. lata, 3- vel rarius 5-nervia, plus minusve triplinervia ; petiolus circiter 5 mm. longus. *Inflorescentiae* axillares ; cymae pauciflorae, 1·5–2 cm. longae, cymulis 5 3-floris compositae ; bracteae ovatae, subacutae, concavae ; pedunculi et pedicelli puberuli, pedicelli 1–2 mm. longi. *Flores* albi (fide *Gamble* in Mat. Flor. Mal. Penins.). *Calyx* 1 mm. longus, segmentis ovato-lanceolatis acutis vel subacutis marginibus hirsutis. *Corolla* 8–9 mm. longa, lobis 2–2·5 mm. longis spathulatis obtusis coriaceis glabris, tubo cylindrico extra minute puberulo vel glabro intus glabro. *Antherae* circiter 1 mm. longae, filamentis brevissimis paullo sub sinubus insertis. *Ovarium* ovoideum, glabrum, 1 mm. longum ; stylus 7 mm. longus, stigmate capitato. *Bacca* globosa, 4–5 cm. diametro, pericarpium lignosum, 3–4 mm. crassum. *Semina* ovoidea vel elliptica, rotundata, circiter 1·8 cm. longa, 1·2 cm. lata, 6–7 mm. crassa, compressa.—*Strychnos Tieuté*, King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 831 partim non Lesch. in Ann. Mus. Hist. Nat., xvi., 479, t. 23 ; *Strychnos Maingayi* var. ? *fructuosa*, C. B. Clarke in Hook. f. Flor. Brit. India, iv., p. 88.

Malay Peninsula. Penang, *Curtis*, 700, 1490 ; *Ridley*, without number ; *Maingay*, 2286 (*K.D.* 1038). Perak : Larut, *King's Collector*, 5348, 10595. Singapore, *Ridley*. Malacca, *Corporal Ali* and *Corporal Hasan*. Without precise locality, *Cantley*, 176.

This species, which appears to be confined to the Malay Peninsula, has been identified in "Materials for a Flora of the Malayan Peninsula" as *S. Tieuté*, Lesch., and a Bornean plant collected by Beccari has also been ascribed to this same species. The latter plant had previously been described by Gilg as a new species under the name of *S. Beccarii*, Gilg in Notizbl. Kgl. Bot. Gart. Berlin, no. 8 (1897), p. 267, and it has also been referred to *S. Tieuté*, Lesch., by Dop in his recent contribution to the study of Asiatic *Loganiaceae* (Bull. Soc. Bot. Fr., ser. 4, x., 1910, mem. 19, p. 16).

S. pseudo-tieuté is closely allied to the other species with long tubular corollas and large fruits. It is, however, easily distinguished from *S. Tieuté*, Lesch., by the relatively small, elliptical, coriaceous leaves, and thinner-walled fruits. *S. Beccarii*, Gilg, appears to be its nearest ally with ovate leaves rounded at the base, and larger flowers ; the corolla tube, however, is hairy within, and the anthers are larger than those of *S. pseudo-tieuté*. *S. Gauthierana*, Pierre, has much larger trinerved leaves and larger seeds. The material of some of the species is very imperfect, and it may be found eventually that *S. pseudo-tieuté* and *S. Beccarii* are conspecific, but in the present state of our knowledge, and also taking the geographical separation into consideration it seems better to treat them as distinct species.

Strychnos cuspidata, *A. W. Hill* in Kew Bull., 1909, p. 359.

Borneo. Sarawak : Kuteing, *Beccari*, 1188, 1348 ; Borneo Central : Ipoe Kajo, *Nieuwenhuis* in Herb. Hort. Bot. Reg.

This plant shows close affinity with *S. Tieuté*, *S. Ignatii*, and their allies. The leaves are elliptical, trinerved, and abruptly acuminate at the apex with a long drip tip, and are unlike those of any other species.

The flowers are similar to those of the allied species, but *S. cuspidata* may be readily distinguished from all others by its characteristic leaves. The fruits are not known. The bark of this species, according to Dr. Nieuwenhuis, is used, as well as that of other species of *Strychnos*, for making arrow-poison in Central Borneo, and according to the same authority the bark of five other undetermined species, of which he only collected leaf-bearing specimens, is used for a similar purpose in Central Borneo, where the natives are still making use of poisoned arrows.

S. Gauthierana, *Pierre* MSS., *P. Dop* in Bull. Soc. Bot. Fr., ser. 4, x., 1910, p. 17. *S. malaccensis*, C. B. Clarke quoad syn. in Hook. f. Flor. Brit. Ind., iv., p. 89, et King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 829, non Benth.

INDO-CHINA. Tonkin: Nghe-han, Conchank, *Lesserteur*, H.P., 1663; Lang-kok, *Balansa*, 2129.

In the Flora of British India, C. B. Clarke referred this species to *S. malaccensis*, Benth. He did this on the evidence of a drawing, sent to Kew by Pierre, representing the leaves only. Had he seen flowers there can be no doubt that he would have pointed out the resemblance of *S. Gauthierana* to *S. Tieuté*, Lesch., as does Dop in his recent study of Asiatic *Loganiaceae*. King and Gamble (Mat. Flor. Malay Penins. iv, p. 829) merely repeat Clarke's mistake.

The seeds of this species show considerable resemblance to those of *S. Ignatii* from the Philippines, though they are smaller and more compressed, but it seems probable that they could and perhaps may be used for the same purpose.

This species was first brought to the notice of Kew in a letter from Dr. Pierre, Director of the Botanic Garden, Saigon, Cochin China, dated June 25, 1877, who also sent a drawing of the leaves. Pierre gave the plant the name *S. Gauthierana*, but published no description. The native name is Hoâng-nan, and a short account of the drug, said to be a cure for leprosy, is given in the Kew Report, 1877, p. 31. In the same letter Pierre refers to St. Ignatius' beans, and suggests that they are only the Lukrabo seeds of commerce (*see* Kew Report, 1877, p. 33), which suggestion, however, proves to be erroneous, as these latter seeds belong to *Hydnocarpus anthelmintica*, Pierre (*see* Pharm. Journ. [3], xv., p. 41).

Loureiro, Flor. Cochin China, 1790, p. 126, refers to this plant under the name *Ignatiana Philippinica*, and suggests that it has been introduced into Cochin China from the Philippine Islands.

De Lanessan, Les Plantes utiles des Colonies Français, Flor. Cochin (1886), p. 767, refers to *S. Gauthierana*, Pierre, as follows :—

"Cette plante grimpante a été découverte dans les montagnes qui séparent l'Annam du Laos à la hauteur du Tonkin méridional. Elle se rapproche par ses caractères botaniques du *Vomiquier* et du *Strychnos javensis*.

"Son écorce, d'un rouge ocreux ou plus rarement d'un gris noirâtre, est très amère et renferme de la *Strychnine* et de la *Brucine*. Elle porte le nom de *Hoang-nan* et sert à traiter la lèpre et les maladies rebelles de la peau."

Dr. Shoemaker (*see* Pharm. Journ. [3], xx., 1889, p. 425) directs attention to the use of Hoâng-nan in skin diseases. . . . He cannot endorse the eulogies on its virtues, but finds it has a stimulant, corroborant, or alterative action upon the cutaneous

glandular systems both perspiratory and sebaceous. . . . He found no satisfactory result with leprosy after three months, nor with erysipelas, but it answered well for skin diseases accompanied by defective nutrition. He remarks that it contains *Strychnine* and *Brucine*, the latter in larger proportion, to which presumably the medicinal properties of the bark are due.

Strychnos Ignatii, *Berg.*, Mat. Med. i, p. 146 (1778); Oliver in Hook. Ic. t. 2212; Tavera in Med. Pl. Philipp. Is. (trans. Thomas), 1901, pp. 171–173; De Lanessan, Pl. Utiles des Colon. Franç. Flor. Cochin. 1886, p. 767; *Strychnos philippensis*, Blanco, Flor. Filip. ed. 2 (1845), p. 61.

Philippine Islands. Mindanao: *Boxall* in Herb. Kew; Lake Lanao, *Clemens*, 895; Central Mindanao, *Lyon*.

Samar: Catbalogan, *Carrothers*, *Guerrero*, *Cullen* (seedlings), 10,835.

Mr. Merrill informs us that the plant is said to be common in the Visayan Islands, especially in Leyte and Samar. It is not known from Luzon though seeds sold in Manila have been wrongly quoted as coming from that island. The history of the synonymy and the difficulties which have attended the exact determination of the source of St. Ignatius' beans has been so well set forth by Oliver in Hooker's Icones, t. 2212, that it is unnecessary to reopen the question again. The difficulty as to whether one or two plants yields the commercial product known as St. Ignatius' beans still unfortunately remains an open one, and must so remain until the floras of the islands of Samar and Mindanao are more thoroughly known. The seeds which reach this country are fairly uniform in character and do not appear to be mixtures, but the seeds of *S. Gauthierana* from Cochin-China are very similar, and it is possible that even if there is only one source of the drug in the Philippines, they may be mixed subsequently by the Chinese.

Loureiro* states that *S. Ignatii* has been introduced into Cochin-China from the Philippine Islands and it is also mentioned by De Lanessan.† Whether this is so or not, it seems clear that *S. Gauthierana* from Cochin-China, though very closely allied to *S. Ignatii*, is sufficiently distinct to be maintained as a species.

The general question of the difficulty of the exact determination of *S. Ignatii* is discussed in the introductory part of this paper and need not be repeated here. Owing to the persistent kindness of Mr. E. D. Merrill it is now quite clear that the plant figured in the Icones (*see* Plate‡) does yield the St. Ignatius' beans of commerce, and the name *S. Ignatii*, Berg., may therefore very properly be retained for this well-defined species. Should it be found eventually that another plant yields similar seeds, as the statements of Boxall and Guerrero and Vidal's picture would lead one to expect, the name *S. Ignatii* given to the plant with the elongated corolla tube need not be disturbed.

Mr. Merrill has recently sent ripe fruits with seeds to Kew with the following information :—

"The material came from the Samar exhibit at the Philippine 'Carnival' just closed, and was labelled 'Igasud,' which appears to be

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* Loureiro, Flor. Cochin (1790), p. 126.

† De Lanessan Pl. Utiles des Colon. Franç. Flor. Cochin (1886), p. 767.

‡ Through the kindness of the Bentham Trustees the Plates of *S. Ignatii* and *S. multiflora* published in Hooker's Icones are here reproduced.

the universal Samar name. There were 10 or 12 fruits exhibited, mostly immature. My notes on the one mature fruit secured are as follows: Globose, 10·5 cm. in diameter, somewhat straw-yellow and brown, containing 18 seeds, each seed surrounded by a thick, soft, pulpy covering, but each seed and its pulp distinct from the others, readily separating, the seeds and pulp quite filling the interior of the fruit. Pulp with the odour of a ripe squash, quite the colour and consistency of a fully ripened mango, almost 'luteus' of Saccardo's Chromotaxia. Fresh seeds not at all wrinkled, with a somewhat 'satiny' appearance."

Mr. Merrill has also kindly forwarded to Kew two seedlings of *S. Ignatii* received by him from Dr. G. I. Cullen, District Medical Officer, Catbalogan, Samar, who also writes that "The leaves of this plant are extensively used by chopping them up fine and making a sort of infusion to be used for colic or gastric indigestion; it is also used as a sort of poultice for abscesses prior to the stage of suppuration." The seedlings are in the cotyledon stage and have hypocotyls about 20 cm. long. The cotyledons are sessile, broadly ovate, 13 cm. long, 7–7·5 cm. broad, abruptly acute at the apex, rotund-cuneate at the base, subglabrous, dark green above, light green below, with seven well-marked nerves springing from the base.

As to the exports of St. Ignatius' beans, Mr. Merrill wrote in December, 1909, "Some months ago I was informed that a recent shipment from Laguan Samar to Manila amounted to about 1,000 lbs., and that this was considered to be a very large shipment."

Strychnos Beccarii, *Gilg* in Notizbl. des Kgl. Bot. Gart. Berlin, no. 8 (1897), p. 267.

Borneo, *Beccari*, 1580: Amai Ambit (Liang Kutang), Mandai river, 104° 8′ E., 0° 40 N., *Hallier*, 3153, B (?). *S. Tieuté*, King and Gamble in Mat. Flor. Mal. Penins. iv, no. 19, p. 831, partim; P. Dop in Bull. Soc. Bot. Fr. ser. 4, x, (1910) mem. 19, p. 16, non Lesch.

Both Gamble and Dop appear to have overlooked the fact that Beccari's specimen from Borneo had been described as a distinct species by Gilg in 1897 as no reference to this species is given by them. *S. Beccarii*, Gilg, is closely allied to *S. Tieuté*, Lesch., and to the other long-tubed species. As in *S. Tieuté* the leaves are slightly triplinerved.

One specimen received from the Buitenzorg herbarium collected by Hallier in Borneo, consisting of leaves and fruits, should probably be referred to *S. Beccarii*, Gilg. The leaves are rather larger than those of Beccari's specimens, being as much as 10 cm. long, but they agree closely with those of *S. Beccarii* in the abrupt elongated apex. The thick-walled fruits, which are 5–6 cm. in diameter, with walls about 2 mm. thick, are very like those of *S. Tieuté*. The seeds are ovate-oblong, compressed, 2·3 cm. long, 1·2 cm. broad, slightly pointed at the broader end and rounded at the other. They are narrower and more compressed than those of *S. Tieuté* sent to Kew from Buitenzorg.

Another specimen, with leaves only, received from Buitenzorg and collected by Hallier at Polve Lemukutan, Borneo (367 B), shows resemblance both to *S. Tieuté* and *S. Beccarii*, though rather more markedly to the former species. It appears, however, to be

distinct, having obovate leaves, abruptly elongate-acuminate at the apex, and cuneate at the base, subcoriaceous, glabrous, and scarcely varnished on the upper surface.

It seems clear from the imperfect specimens in herbaria that there must be several undescribed species of *Strychnos* in Borneo.

Strychnos Tieuté, *Lesch.* in Ann. Mus. Hist. Nat., xvi., 479, t. 23 ; Blume in Rumphia, i, p. 67, t. 24. A.DC. in DC. Prodr., ix., p. 13 ; Miq. Flor. Ned. Ind., ii., p. 380 ; Benth. in Journ. Linn. Soc. i (1857), p. 103 ; King and Gamble in Mat. Flor. Mal. Penins., iv., no. 19, p. 831, partim, non Dop in Bull. Soc. Bot. Fr. sec. 4, x., (1910) mem. 19, p. 16, descr. emend.

Folia elliptica, acute acuminata, 8–12 cm. longa, 3·5–6 cm. lata, 3-nervia, paullo triplinervia, superne paullo vernicosa ; petioli 5–7 mm. longi, rami et petioli glabri. *Inflorescentiae* axillares, paniculatae, 2–4 cm. longae, pedunculis lateralibus 3–4 compositis cymis 3-floris gerentibus, pedunculis pubescentibus. *Flores* pentameri. *Calyx* 1·5 mm. longus, segmentis ovatis subacutis minute pubescentibus marginibus ciliolatis. *Corolla* 0·9–1·2 cm. longa, lobis 3–5 mm. longis ellipticis coriaceis subacutis glabris, tubo inferne sparse hirsuto. *Antherae* 1·5–2 mm. longae, glabrae. *Ovarium* glabrum, cum stylo 0·8–1·1 cm. longum. *Bacca* globosa, 4·5 cm. diametro ; pericarpium 1·5–2 mm. crassum. *Semina* numerosa, elliptico-rotundata, pilis apressis instructa, 2·2–2·4 cm. longa, 1·6–1·7 cm. lata, circiter 1 cm. crassa, plus minusve plano-convexa.

Java. *Teysmann* (1867) with flowers ; spec. cult. in Hort. Bog. sub signo x., G. 21. *Dr. H. Hallier* (5, v., 1893) no. C. 110 ; cult. in Hort. Bog. x., G. 46 and 46a ; spec. *Herb. Blume*, with label "conf. Rumphia, vol. i., tab. 24" ; *Herb. Bl.*, "ser. Blume ipse" ; Archipel. Ind., no precise locality, *Teysmann* ; "Tjettek" ? *Reinwardt*, 1599 ; Java Orient., Banjawangei, *Reinwardt*, 1599 (2 sheets both in young condition agree with Horsfield, Kew) ; *De Vriese* et *Teysmann* in Herb. Lugd. Bat. 908, 127–1394. *Zollinger*, 2635 in Herb. Kew. et Herb. Mus. Brit. ; "Tjettek." *Horsfield*, 368 in Herb. Kew. *Horsfield* in Herb. Acad. Rheno-Traj. ; cult. in Hort. Bog. *Pulle* in Herb. Acad. Rheno-Traj.

From the material at Leiden, it is clear that the Javanese specimens, attributed, and rightly so, to this genus, are not conspecific with the specimens from the Malay Peninsula, the leaves are considerably larger and less coriaceous than those of the Malayan plant, and only slightly varnished above. The fruits have thinner walls and the seeds are distinct in being plano-convex, and about 1 cm. in thickness. Specimens of this plant cultivated in the Botanic Gardens, Buitenzorg, have recently been received at Kew, owing to the kindness of Dr. Koningsberger, which fully confirm its specific identity. He informs me that neither the seeds, bark nor leaves are used for any purpose in Java.

Seeds have germinated at Kew. The cotyledons are rotund-ovate, abruptly acute or subacute, 7–8 cm. long, 6·5 cm. broad, 5-nerved from base, bright green and varnished above, bright green below.

S. pubescens, *Clarke* in Hook. f., Flor. Brit. Ind., iv., p. 89 ; King and Gamble, Mat. Flor. Mal. Penins., iv., (19), p. 620 ; Dop in Bull. Soc. Bot. Fr., sec. 4, x., 1910, p. 16.

Penang, Perak, Malacca, Singapore, Indo-China, etc.

Borneo. Sarawak: Mattang, *Beccari*, 2035; Bangermassy, *De Vriese*, x. (1403) in Herb. Lugd. Bat.

The specimens from Borneo appear to agree exactly with those from Malay, and shew close resemblance both to *S. axillaris* and also to *S. Ridleyi*.

S. palembanica, Miq. from Java, is also closely allied to these species. They all shew the interesting character of a well-defined narrow line of hairs across the middle of the inner face of the corolla lobes, and have the anthers bearded at the base (*see* fig. p. 294).

A specimen with large pubescent triplinerved leaves collected by Dr. Nieuwenhuis in Central Borneo (No. 4), recently received from Buitenzorg, probably represents a distinct and undescribed species, but there are no flowers or fruits.

S. palembanica, *Miq.* in Flor. Ind. Bat. Suppl., pp. 227, 551, descr. emend; species *S. axillari*, Colebr., arcte affinis, ovario glabro differt.

Frutex, ramis petiolisque superne pilis appressis instructis. *Folia* ovato-lanceolata vel elliptica, acuminata, basi rotundato-cuneata, 5-nervia, triplinervia, 7·5–10 cm. longa, 3·5–4·2 cm. lata, subtus in angulis inter costam mediam et nervos laterales pilis instructa vel subglabra. *Corolla* 3·5 mm. longa, lobis 2 mm. longis, tubo glabro lobis intus medio linea pilorum horizontali notatis. *Antherae* 0·75 mm. longae, basi retrorso-villosae. *Ovarium* globosum, glabrum; stigmate clavato.—*S. Pilgeriana*, Gilg in Notizbl. des Kgl. Bot. Gart. Berlin, 1897, no. 8, p. 268.

Sumatra. *Forbes*, 3245 in Herb. Lugd. Bat. et Mus. Brit.; Palembang, Moearu Enim., *Hb. Bl.* 3669; in Herb. Lugd. Bat. et Herb. Acad. Rheno-Traj.; without locality *Teysmann* in Herb. Lugd. Bat. (?); without locality *Forbes*, 2955a in Herb. Mus. Brit. (?).

This species is very closely related to *S. axillaris*, Colebr., from the Khasia Hills. Indeed, so close is the agreement that I can find no certain means of separation, and it is also very nearly related to *S. Horsfieldiana* from Java. As no fruits have been collected with any of these species, and in view of the geographical separation, it seems best for the present to maintain Miquel's species, *S. palembanica*, for the Sumatran plant. In the Leiden Herbarium, Blume's plant from Java has been referred to *S. axillaris*, and at Berlin Gilg has named Forbes' plant from Sumatra, *S. Pilgeriana*. The Leiden specimens of Blume's and Forbes' plants are very similar, and closely resemble several specimens in that Herbarium, consisting only of leaves, apparently collected in Java or Sumatra.

There is a further confusion in the matter as one of the Kew specimens labelled *S. Horsfieldiana* does not belong to that species, but represents a hitherto undescribed species (see *S. villosa*, A. W. Hill).

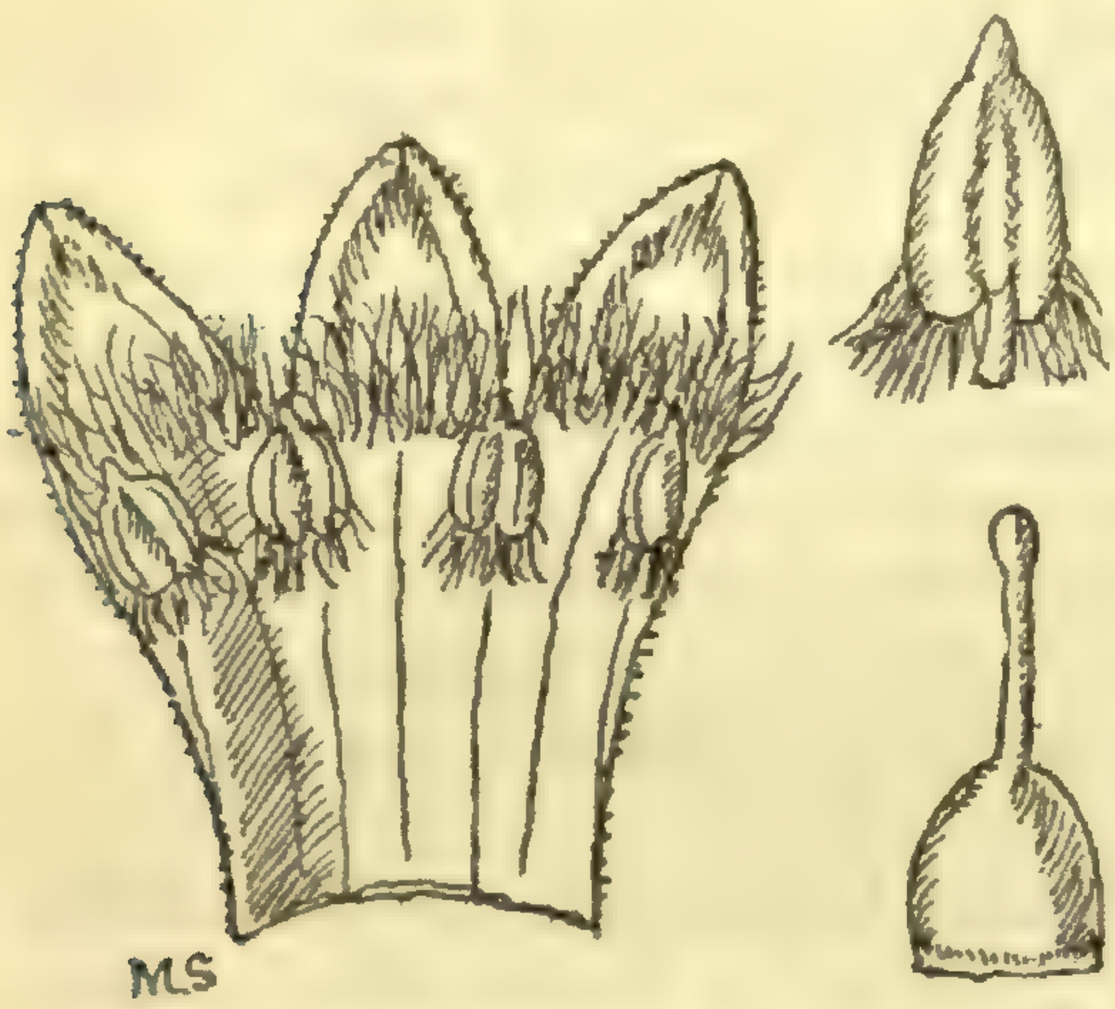
The original description of *S. palembanica* has been emended after examination of the Leiden material ascribed to *S. axillaris* and Forbes' material from Sumatra. Certain points, such as the hairy stems, the hairs in the axils of the nerves on the back of the leaf, the line of hairs in the corolla lobes and the bearded anthers, have not been exactly defined by Gilg, whose description otherwise applies well to *S. palembanica*,

Miquel describes his species, *S. palembanica*, from leaves and calyx only, but from an examination of the material at Utrecht, Leiden, and the British Museum, it seems practically certain that his plant and Gilg's *S. Pilgeriana*, are identical.

S. palembanica, which may be regarded as the Sumatran form of the "*axillaris*" group, may be distinguished from the Javanese form, *S. Horsfieldiana*, by its larger ovate-elliptic leaves which are rotund-cuneate at the base.

S. Horsfieldiana, *Miq.* in Flor. Ned. Ind. ii., p. 379, descr. emend.

Ramuli obtuse tetragoni, pube subtilissima sericco-inspersi. *Folia* ovato- vel elliptico-lanceolata, attenuato-acuminata, vetustiora subcoriacea, superne vernicosa, 6·5–8 cm. longa, 2–3 cm. lata, triplinervia, basi acuta vel anguste cuneata, in nervis subtus et costa supra versus basin pube subtilissima sericeo-inspersa; subtus in angulis costae pilis instructa; petioli 5 mm. longi, minute et adpresse pubescentes. *Cymae* axillares, pauciflorae, inconspicuae; pedunculi 5 mm. longi, minute pubescentes. *Calycis* laciniae lato-ovatae, acutuisculae, subpuberae, ciliolatae. *Corolla* 3 mm. longa, extra subpubera, lobi 1·5 mm. longi, intra medio linea pilorum notati. *Antherae* basi retrorso-villosae. *Ovarium* glabrum. *Fructus* ignotus.



Java. Patjitan, *Horsfield* in Herb. Kew (m), Herb. Mus. Brit., Herb. Lugd. Bat. et Herb. Acad. Rheno-Traj.; without precise locality, *Herb. Bl.* 1695 in Herb. Lugd. Bat. 202, 450 (figd.); Archipel. Ind. *Teysmann* in Herb. Lugd. Bat.

Miquel described this species from a small piece of stem bearing two leaves. The flowers closely resemble those of *S. pubescens*, *S. axillaris* and *S. palembanica* in having a line of hairs across the inner face of the corolla-lobes and in the bearded anthers.

The only satisfactory characters by which this plant can be separated from *S. palembanica*, are to be found in the leaves which are narrowly elliptic- or ovate-lanceolate and sharply cuneate at the base. In the angles between the mid-rib and lateral nerves, on the under side of the leaf, a group of fine hairs is present, and the stem and petioles are also covered with short, appressed hairs. The flowers are borne in delicate, axillary, few-flowered cymes and agree closely with those of *S. axillaris* and *S. palembanica*.

Owing to the differences in the foliage between the Javan and Sumatran specimens, it seems best to retain both *S. Horsfieldiana* and *S. palembanica* as species, and to refer the Javan specimens to the former, and the Sumatran to the latter species.

Strychnos monosperma, *Miq.* in Flor. Ned. Ind. ii., p. 381, from the island of Noesa Kambangan on the south side of Java, may be only *S. Horsfieldiana* or a closely allied species, but no specimens have been seen.

Strychnos Forbesii, *A. W. Hill* in Kew Bull. 1909, p. 360.

New Guinea. Sogeri region, *H. O. Forbes*, 216, 230 in Herb. Lugd. Bat. et Herb. Kew.

The specimens at Leiden are in better condition than those at Kew, and the following emendation of the original description is necessary.

Folia ovato-elliptica, apice caudata, subacuta, 14–20 cm. longa, 6–7·5 cm. lata, subtriplinervia.

The veins do not run straight across from the median to the side nerves, but tend to form a meshwork in which an irregular intermediate nerve may be traced.

Strychnos vitiensis, *A. W. Hill*; species distincta nulla arcte comparanda, *S. barbatae*, A. W. Hill, in folii circumscriptione nervibusque et antheris barbatis similis sed ab ea praecipue corollis glabris minoribus facile distinguenda.

Frutex scandens, glaber. *Folia* ovata vel elliptica, acuta, basi cuneata, 10–11 cm. longa, 5 cm. lata, 5-nervia, conspicue triplinervia, coriacea, supra vernicosa; petioli 1–1·5 cm. longi. *Inflorescentiae* axillares, paniculatae, multiflorae, 5–7 cm. longae, e cymis 3–7-floris compositae; pedunculis pedicellisque pilis minutis apressis instructis; pedicellis circiter 1 mm. longis. *Calyx* 0·5 mm. longus, segmentis late ovatis subacutis pubescentibus marginibus hirsutis. *Corolla* 2·75 mm. longa; lobi ovati, acuti, repandi, 1·75 mm. longi cum tubo omnino glabri. *Antherae* subsessiles, paullo sub sinubus insertae, ovatae, basi retrorso-villosae, 0·75 mm. longae. *Ovarium* ovoideum, 0·5 mm. longum, glabrum; stylus 0·5 mm. longus, crassus, stigmate capitato. *Fructus* ignotus.—*S. colubrina*, Seemann in Flor. Vit. p. 166, non Linn.

Fiji Islands. Viti Levu, *Seemann*, 302; *Milne*, 64.

An interesting plant apparently endemic in the Fiji Islands. Its nearest ally appears to be *S. barbata*, A. W. Hill, from New Guinea. It may be easily distinguished from that species by the compact panicles of small flowers with their glabrous corollas and subsessile anthers.

Strychnos ovata, *A. W. Hill* in Kew Bull. 1909, p. 360.

Philippine Islands. Is. Paragua, *Vidal*, 3315.

This is the only species of *Strychnos* so far known from the Island of Paragua midway between Luzon and Borneo. The corolla tube is very short, and the plant is perhaps more nearly allied to *S. multiflora* than to any other species. Fruits and seeds are unfortunately unknown.

It is possible that a specimen from the Island of Ticao (*W. W. Clark*, 20187, Forestry Bureau, 1061), between the southern end of Luzon and Masbate may belong to this species. In this latter specimen the fruits and seeds resemble those of *S. multiflora*, but are much smaller, the fruits being about 1 cm. in diameter with a thin, brown, shining pericarp. Another doubtful specimen at Kew from Luzon, Prov. Albay, Castilla, *Vidal*, 3936, may also belong to *S. ovata*.

Strychnos lanceolaris, *Miq.* in Flor. Ind. Bat. Suppl. pp. 227, 551; descr. emend.

Frutex scandens, caulibus glabris. *Folia* elliptico-lanceolata vel ovato-lanceolata, acute acuminata, basi cuneata, 5–9 cm. longa, 1·5–3 cm. lata, coriacea, superne vernicosa, 3–5-nervia, triplinervia, venis lateralibus numerosis transveris paullo anastomasantibus; petioli circiter 5 mm. longi. *Inflorescentiae* axillares, in racemis vel paniculis 2–2·5 cm. longis dispositae, cymis 4–8 3-floris; pedunculi et pedicelli subhirsuti; bracteae ovatae, concavae, obtusae, circiter 1·5 mm. longae. *Calyx* 1·5 mm. longus, segmentis ovatis obtusis pubescentibus marginibus ciliatis. *Corolla* 2·5 mm. longa, extra minute pubescens, intus glabra; lobi 2 mm. longi, elliptici, subacuti, paullo cucullati, tubo 0·5 mm. longo. *Antherae* ovatae, circiter 0·4 mm. longae, paullo sub sinubus insertae. *Ovarium* globosum, inferne glabrum, superne cum stylo minute puberulum; ovarium 1 mm. diametro; stylus 1 mm. longus.

Sumatra. *Korthals* in Herb. Lugd. Bat. "(Escobaria scandens) 'ser. Miquel ipse'"; Palembang, near Derma Enim, *Teysmann* (with note, specimen citat. Miq. Sumatra, p. 551). Derma Enim, *H.B.*, 3659 ex Herb Univ. (Temeras Akkar) and in Herb. Hort. Bot. Utrecht (no. 15).

The Palembang specimen consists only of two leaves, with a short piece of stem. The leaves agree with Korthals' specimen and measure 8 cm. long by 3 cm. across. A third specimen in Herb. Lugd. Bat. has also two leaves and a piece of stem. Miquel describes the fruit as follows: "bacca depresso-globosa, 4 poll. diam., crasse corticata, polysperma, epicarpio nigrescente albido verrucelloso."—"Species fructu valde insignis, Str. Tieuté praesertim affinis videtur."

A specimen collected at Sungei Kelantan Siak, Sumatra (*Ridley*, 9008), preserved at Kew, consisting of young leaves only, should probably be referred to *S. lanceolaris*.

S. villosa, *A. W. Hill*; species *S. lanceolari*, Miq., affinis, inflorescentiis paniculatis terminalibus villoso-pubescentibus praecipue differt.

Folia ovato-lanceolata vel elliptico-lanceolata basi rotundato-cuneata vel subcuneata, triplinervia, acuta vel attenuato-acuta, glabra, superne vernicosa, 7·5–13 cm. longa, 2·8–5 cm. lata; petioli 0·5–1 cm. longi, glabri. *Flores* numerosi, in paniculas terminales dispositi; pedunculi et pedicelli villoso-pubescentes; bracteae ovatae, dense villosae. *Calycis* laciniae rotundato-ovatae, acutiusculae, extra villosae, marginibus hirsutis. *Corolla* immatura circiter 1·5 mm. longa, extra villosa, lobis 1 mm. longis ovatis acutis intus subglabris, tubo glabro. *Antherae* 0·65–0·75 mm. longae, glabrae vel basi pilis paucis instructae. *Ovarium* globosum, glabrum, 0·5 mm. longum; stylo 0·5 mm. longo.

Java. Wukau. *Horsfield*, 1319 in Herb. Kew.

This plant has been confused with *S. Horsfieldiana* at Kew. It differs in its terminal panicles with their almost woolly covering of hairs; in the glabrous leaves and in the flowers which do not shew the characteristic line of hairs on the corolla segments. On account of the confusion it has seemed advisable to describe the specimen although the flowers are not fully mature.

Strychnos luzonensis, *Elmer* in Leaflets Philipp. Bot. i. (1908), p. 332.—*S. multiflora*, Benth., quoad *Elmer*, 7885.

PHILIPPINE ISLANDS. Luzon: Lucban, *Elmer*, 8251; *Curran* (Forestry Bureau) 19,159 in Herb. Ins. Philipp. (?).

In describing this new species Elmer bases his description on two specimens. One of these, no. 8251, bearing a terminal inflorescence, has ovate-lanceolate leaves rounded at the base. The other, no. 7885, is a fruiting specimen and has elliptical leaves cuneate at the base but bears no flowers. The former appears to be the type of a new species, closely allied to *S. multiflora*. The latter plant appears to be only a narrow-leaved form of *S. multiflora* and there are several other leaf specimens from various collectors which agree with it. These are included under *S. multiflora*. The flowers in the type specimen of *S. luzonensis* are arranged in a terminal panicle and are smaller than those of *S. Merrillii*. The leaves also are more acuminate.

Strychnos Merrillii, *A. W. Hill*; species *S. multiflorae*, Benth., affinis, foliis ovatis et paniculis multo minoribus, corollae tubo breve praecipue distinguenda.

Folia ovata, acuta vel acute acuminata, 4–6 cm. longa, 2–4 cm. lata, 5-nervia, triplinervia, superne vernicosa, nervis marginalibus tenuibus nervis 3 principalibus 3–4 mm. supra basin ortis; petioli 2–5 mm. longi, rami et petioli parce pubescentes vel subglabri. *Inflorescentiae* paniculatae, axillares vel terminales, axillares 1·5–2 cm. longi, pedunculi dense pubescentes, pedicilli brevissimi; bractae ovatae, subacutae. *Flores* pentameri; alabastra lineari-lanceolata, obtusa. *Calyx* 1 mm. longus, segmentis rotundo-ovatis obtusis parce pubescentibus. *Corolla* 2·5 mm. longa, lobis 1·5 mm. longis lineari-lanceolatis acutis, tubi fauce hirsuto. *Stamina* filamentis circiter 0·25 mm. longis; antherae circiter 0·75 mm. longae. *Ovarium* ovoideum, 1 mm. longum, superne hirsutum; stylus 1 mm. longus. *Fructus* immaturus (?) circiter 1·8–2 cm. longus.

PHILIPPINE ISLANDS. Luzon: Prov. Rizar, Bosoboso, *E. D. Merrill*, 2807.

A distinct species though clearly allied to *S. multiflora*, Benth. The small ovate leaves and the small flowers with very short corolla tube serve to distinguish the species but its alliance with *S. multiflora* is shewn by the leaves being triplinerved and by the bearded corolla tube and small fruits.

Strychnos barbata, *A. W. Hill* in Kew Bull. 1909, p. 359.

NEW GUINEA. Soron, Olandite, *Beccari*, 98.

This species is allied to *S. multiflora* according to the structure of its leaves and flowers, but it is easily distinguished by the anthers, which are bearded at the base.

Some imperfect specimens from the Aru Islands may belong to this species.

Strychnos laurina, *Wall.* Cat., 1591. A. DC. Prodr. ix., p. 13. Benth. in Journ. Linn. Soc., i., p. 102; Kurz, For. Flor. ii., p. 166; C. B. Clarke in Hook. f. Flor. Brit. Ind., iv., p. 88 (excl. var.); King and Gamble in Mat. Flor. Mal. Penins., iv., p. 825.

BURMA, MALAYA.

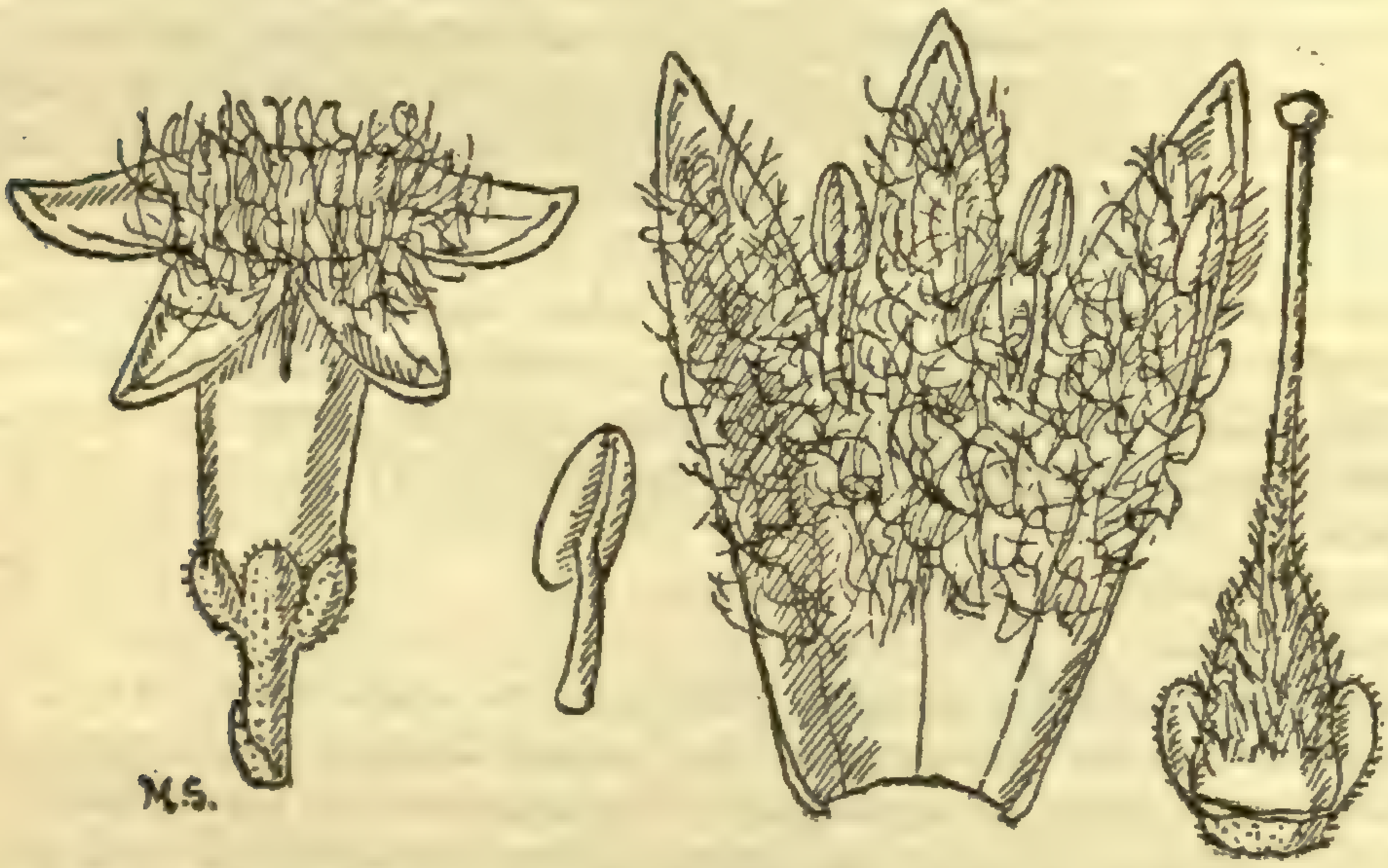
JAVA. Hort. Bog., *Teysmann* ex herb. Miq. in Herb. Kew. et Herb. Lugd. Bat.; also specimen "Cult. in Hort. Bog." in Herb. Lugd. Bat.; "Java? cult." and Hort. Bog. Cult., *A. Pulle* in Herb. Acad. Rheno. Traj.

The Javanese specimens appear to belong to *S. laurina*, Wall., and one of them in the Leiden herbarium has been so labelled by Solereder. The Kew plant agrees exactly with those at Leiden. The leaves are triplinerved; the anthers are very slightly retrorse-villous at the base, and the ovary and style densely hairy.

Two specimens in the Leiden herbarium agree exactly with the *Teysmann* specimen at Kew labelled "Java, ex herb. Miq."; they consist of leaves and flowers, and bear the label "*St. minor*, Bl., C. 107*b*, Java. Corolla alba, Rankenklimmer, teste Solereder potius *S. laurina*, Wall. Leg. Hallier f. 12, x., 1894, in horto Bog. Cult. in Hort. Bog. sub signo x. G. 44." There are also two good specimens at Utrecht, but in almost all, or perhaps all, cases the material seems to have been obtained from cultivated specimens, and it is doubtful whether *S. laurina* is really a plant native to the Island of Java.

Strychnos polytrichantha, *Gilg* in Notizbl. des Kgl. Bot. Gart., Berlin, 1897, no. 8, p. 267.

BORNEO. *Beccari*, 2275, 1190.

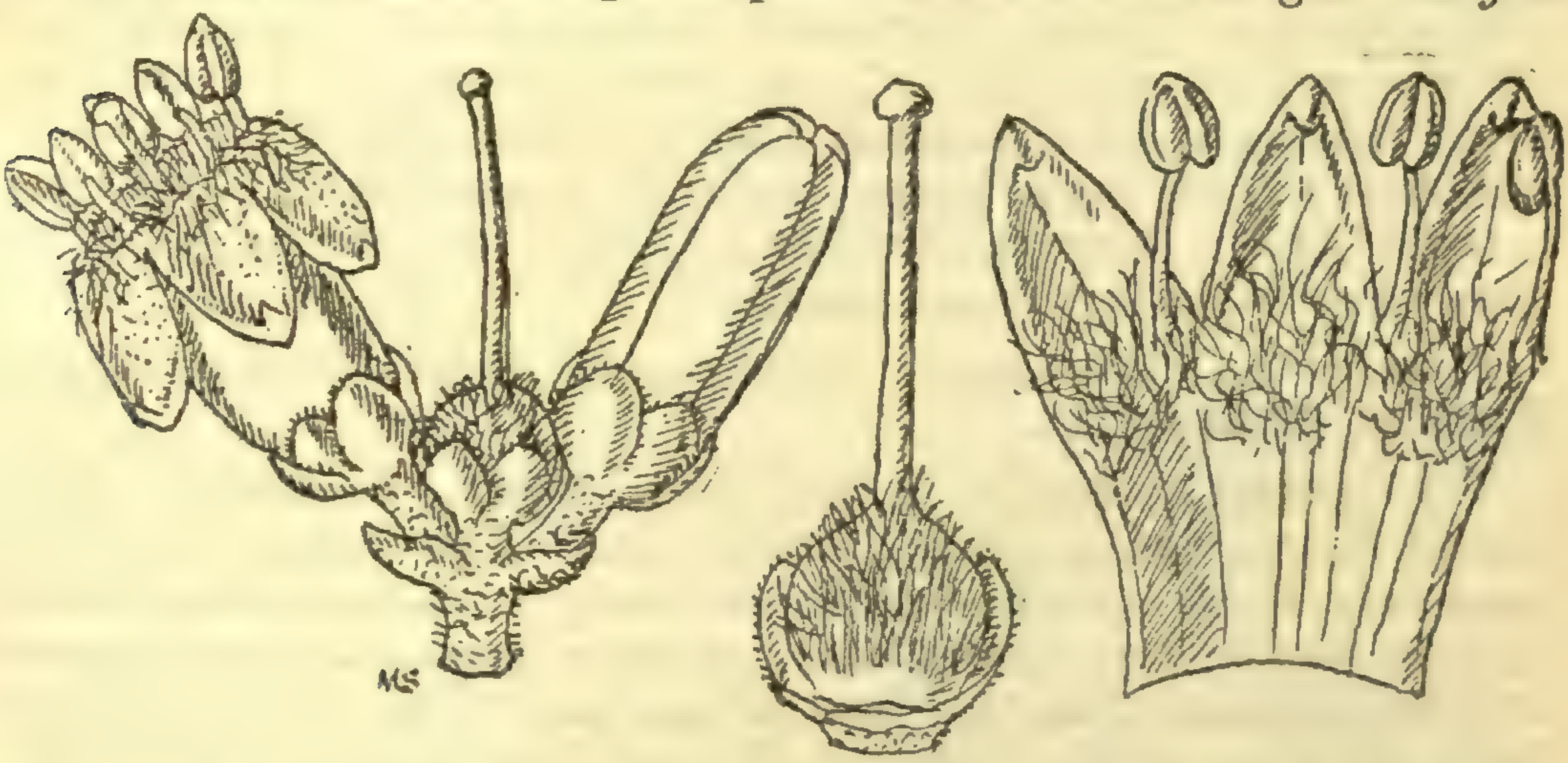


A distinct species with coriaceous trinerved leaves. The flowers have the corolla lobes about equal in length to the tube, and the whole flower is densely hairy inside. In floral structure this species shows some affinity to *S. multiflora*, but the leaves and fruit are quite distinct.

Strychnos dubia, *A. W. Hill*, species *S. multiflorae*, Benth., affinis, sed foliis trinervis, floribus corollae tubo lobis longiore antheris minoribus distincta.

Scandens. *Folia* elliptica, ovata, basi cuneata vel subrotundata, apice breviter acute acuminata, trinervia—rarius brevissime triplinervia—vel sub 5-nervia, nervis marginalibus inconspicuis, 8·5–10·5 cm. longa, 4–5·2 cm. lata, supra vernicosa, subcoriacea; petiolus 5 mm. longus. *Inflorescentia* axillaris, paniculata, multiflora

(*S. multiflora*, Benth., similis), pedunculis et pedicellis fusco-tomentosis ; bracteae triangulari-ovatae, marginibus fimbriatis vel ciliatis. *Flores* in cymas trifloras dipositi, pedicellis 1·5–2 mm. longis. *Calycis*

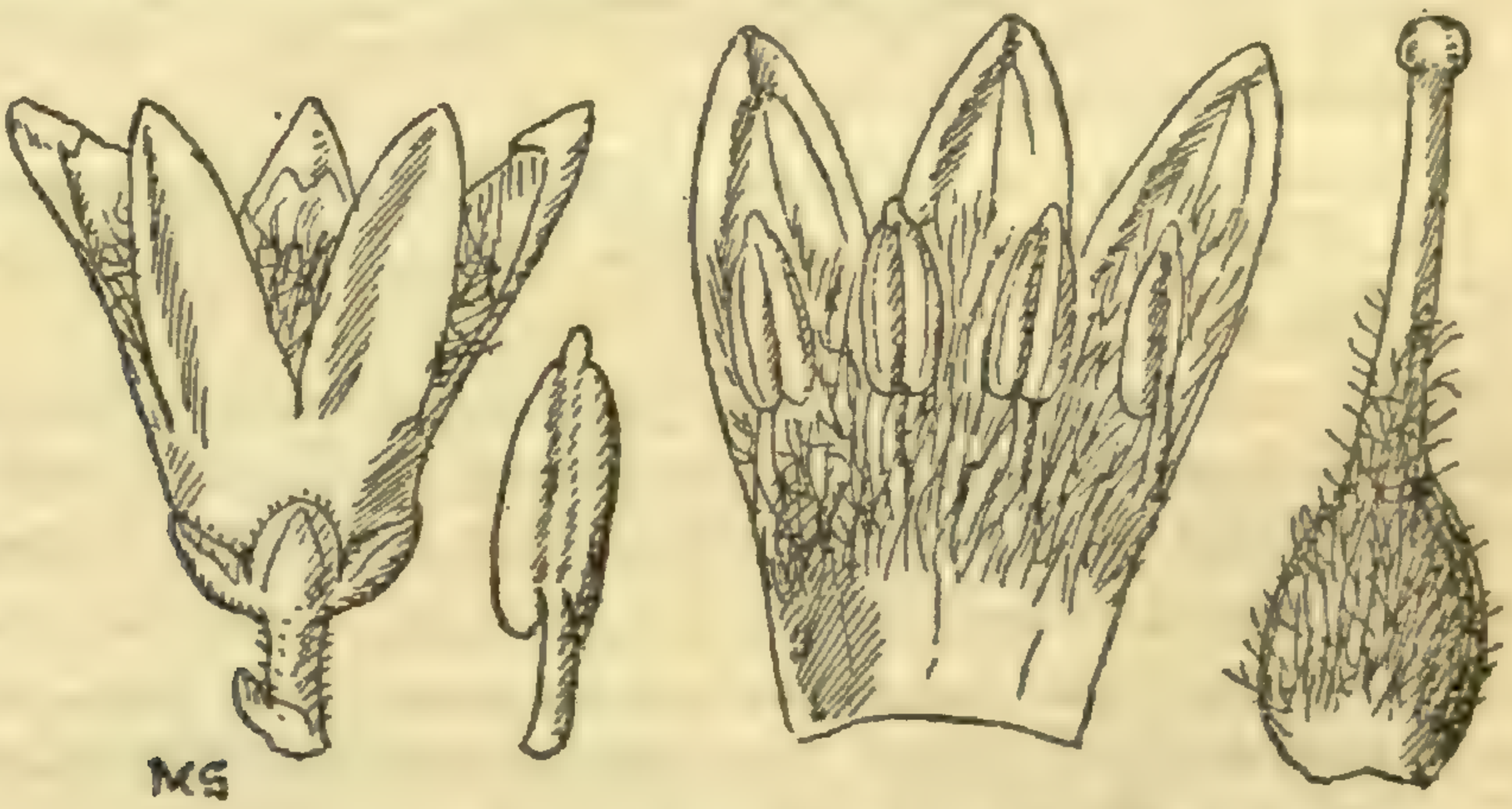


segmentis ovoideis vel rotundato-ovatis subacutis 1–1·5 mm. longis marginibus ciliatis. *Corolla* 5–5·5 mm. longa, lobis 2 mm. longis ovatis acutis, ad faucem hirsuta. *Stamina* filamentis 0·75–1 mm. longis, antherae 0·75 mm. longae. *Ovarium* globosum, hirsutum, cum stylo glabro 3·5 mm. longum. *Fructus* ignotus.

PHILIPPINES. Mindanao : Davao dist. ; Todaya (Mt. Apo), *Elmer*, 10,958.

This plant shows general affinity with *S. multiflora*, Benth., which has also been recorded from Mindanao, but it differs particularly in the leaves, which are scarcely triplinerved, the nerves arising almost from the base of the leaf, though some variation is shewn. The anthers also are much smaller than those of *S. multiflora*. The plant is of interest since its leaves resemble those of *S. Ignatii* rather than *S. multiflora*, while the flowers, though distinct, are obviously similar to those of *S. multiflora* (cf. p. 282).

Strychnos lanata, *A. W. Hill* ; species *S. multiflorae*, Benth., similis, sed alabastris ovatis subacutis, corolla profunde 5-loba, lobis dense tomentosis, stylo hirsuto differt.



Folia ovato-oblonga, 9–18 cm. longa, 4–9 cm. lata, acute acuminata vel acuta, superne vernicosa, 3–5 nervia, triplinervia, nervis marginalibus tenuibus, nervis 3 principalibus plus minusve 0·5 mm. supra basin ortis ; petioli 0·5–1 cm. longi, rami et petioli glabri. *Inflores-*

centia paniculata, axillaris, pedunculis ultimis et pedicellis minute hirsutis ; pedicelli circiter 2 mm. longi ; bracteae triangulari-ovatae, acutae, concavae. *Flores* pentameri ; alabastra ovata, subacuta. *Calyx* 2 mm. longus, segmentis rotundo-ovatis subacutis vel obtusis marginibus ciliatis. *Corolla* 7–8 mm. longa, lobis 5–5·5 mm. longis superne et corollae fauce dense lanato-tomentosis. *Stamina* filamentis circiter 1 mm. longis ; antherae 2 mm. longae. *Ovarium* ovoideum, 2 mm. longum, hirsutum ; stylus 4 mm. longus, hirsutus ; stigma capitatum. *Fructus* ignotus.

Philippine Islands. Mindanao : Lake Lanao, Camp Keithley, *Clemens*, 747.

This species resembles *S. multiflora*, Benth., in having triplinerved leaves, and a short corolla tube. The leaves, however, have only three conspicuous veins, while in *S. multiflora* there may be five or even seven, and the veins leave the median vein at some distance from the base of the leaf. The pointed flower buds are quite unlike those of *S. multiflora*, as are the longer corolla lobes covered with a woolly tomentum on their upper surfaces. The ovary and style are also beset with hairs, and differ in this respect as regards the style from *S. multiflora*. The plant is described as "a white-flowered vine."

Strychnos multiflora, *Benth.* in Journ. Linn. Soc. Bot. i. (1857), p. 102 ; Hook. Ic. xxiii., t. 2213 ; Vidal Pl. Vasc. Filip., p. 191 ; Miq. Flor. Ned. Ind. ii., add., p. 1080.—*S. luzonensis*, Elmer in Leafl. Philipp. Bot. i. (1908), p. 332 quoad *Elmer*, 7885.—*S. potatorum*, L., var. *multiflora*, Vid. Sinops.,* t. 69, fig. D. ; 'Camotain,' Blanco, Flor. Filip. August., t. 208, ed. corr.

Philippine Islands. Luzon : *Cuming*, 641, 695, 1059, 1482 ; *Loher*, 4110, 4111, 4112, 4113, 4114, 4116, 6483, 6506, 6523, 6540 ; *Vidal*, 1615, 3316 ; *Ahern's Collector* (Forestry Bureau), 2875 (figd.), 3249 ; *Williams*, 348, 350 ; *Merrill*, 1607 ; *Elmer*, 6864, 7820, 7885, 8960 (figd.) ; *Whitford*, 776, 24,037 ; *Alvarez* (Forestry Bureau), 18,486, 18,489.

Mindoro : *Merritt*, 1756, 2102.

Culion : *Merrill*, 561.

Mindanao : *Clemens*, 539, 761 ; *Williams*, 2131 ; *Quadras*, 538. *Lyon*, without number in Herb. Kew.

Dutch East Indies. Ceram : *De Vriese et Teysmann*, Herb. Itin. in Ins. Moluc. (1859–60) in Herb. Lugd. Bat., 908, 127–1351, 908, 127–1382.

The fruits and seeds of *S. multiflora* have not been properly described and figured up to the present and as there is now a good series of specimens the following description has been drawn up.

Bacca globoso-ovoidea, 2–2·8 cm. longa, 1·8–2·5 cm. lata ; pericarpium laeve vel rugosum, vernicosum, 0·5 mm. crassum. *Semina* ad normam 1–2, casu 6, plus minusve orbicularia vel oblonga, circiter 1·8–2 cm. longa, 1·3–1·4 cm. lata, compressa, 1–1·5 mm. crassa ; testa reticulata pilis instructa.

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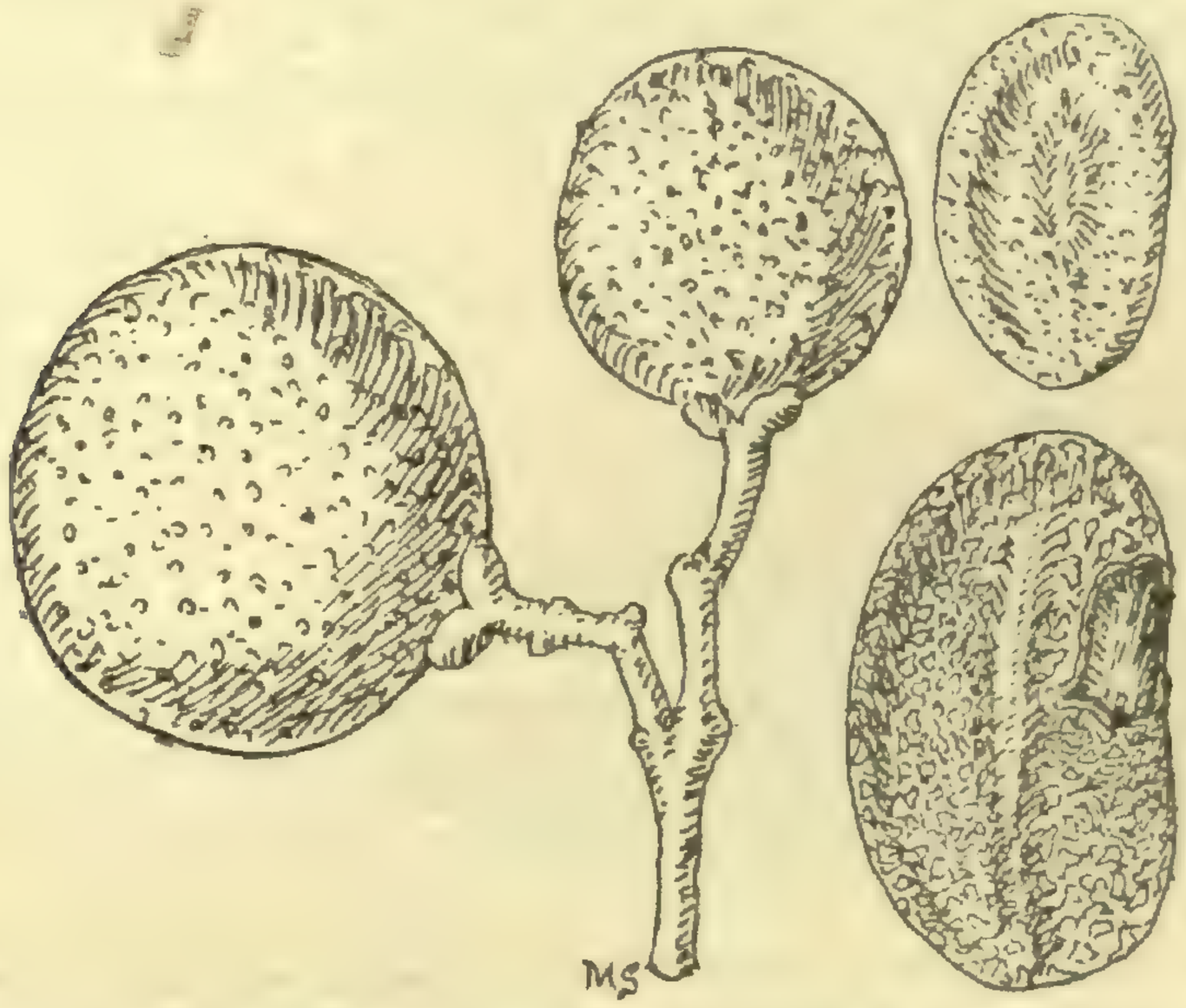
* This figure is very poor ; the leaves are represented with five veins all springing from the base, and the floral details are imperfect.

M.S del. et lith.

Strychnos multiflora, Benth.

To face page 301.]

The fruits, like the leaves, shew considerable variation in size; in most specimens the fruits have a slightly tuberculate pericarp but sometimes it is quite smooth. Two seeds seem to be the normal number but in the case of large seeds as many as six have been found. Mr. Merrill writes that the largest seeds seen by him were not quite mature and slightly exceeded 2·6 cm. in diameter; they apparently contained but one or two seeds.



The flat seeds have a curiously reticulated surface and though hairs are present they do not cover the seed with the satin-like covering which is so characteristic of the seeds of *S. Nux-vomica* and other well-known species.

Strychnos multiflora has been regarded as the species typical of the island of Luzon, but from the specimens preserved in the Philippine Islands Herbarium and from specimens sent to Kew by Lyon, a plant apparently identical with *S. multiflora* occurs also in Mindanao. It is unfortunate that fully developed flowers have never been collected with the specimens from Mindanao but only large buds. The shape and venation of the leaves however is that of *S. multiflora*, and the floral structure also agrees, but in view of Vidal's picture and Mr. Guerrero's statement (*see* pp. 281–282), it is unfortunate that better material is not forthcoming with definite information about the fruits. Three of the specimens from Mindanao (*Clemens*, 761), (*Williams*, 2131), (Quadras, 538), have fruits and the fruits are quite similar to those of *S. multiflora* being globular and small and shew not the slightest resemblance to the large fruits of St. Ignatius' bean.

The specimen from Ceram bears leaves and a seed which agree with those of typical *S. multiflora*. Some difficulty has arisen over the fruiting type of Elmer's *S. luzonensis* which appears to be only a narrow-leaved form of *S. multiflora*. The flowering and fruiting types are without doubt distinct plants and have accordingly been separated; the fruiting specimen has been placed under *S. multiflora*.

Strychnos Bancroftiana, *F. M. Bailey*, from Mulgrave River and Tringilburra Creek near Cairns in North Queensland, is another

plant which possibly should be placed under *S. multiflora*. The specimen consists only of leaves, fruits and seeds which resemble those of *S. multiflora*. Taking these characters into consideration as well as its position near the coast it seems possible that it may have been introduced into Australia and may not be a native plant, especially as it shows no particular affinity to *S. psilosperma*, F. Muell., the endemic Queensland species.

There are also two specimens, consisting of leaves only, collected by Nieuwenhuis in Central Borneo whieh may be found to belong to *S. multiflora* or some closely allied species.

Species Imperfectly Known.

S. acuminata, *Wall.* Cat. 1593 in part. C. B. Clarke in Hook. Flor. Brit. Ind. iv. p. 86 (?).

Borneo. Bangarmassing, *J. Motley*, 902.

A specimen in bud only, with subtriplinerved leaves 10–12 cm. long, 3–4·5 cm. broad, acute, rounded-cuneate at the base, glabrous. Corolla about 3 mm. long with lobes about 2 mm. long, the throat of the corolla and base of the lobes hairy. Anthers bearded at the base, and style and ovary hairy.

Has been referred to *S. acuminata*, Wall., by C. B. Clarke in the Kew Herbarium, but the determination is doubtful.

Strychnos sp.

North Celebes. Gorontalo, *Riedel* in Herb. Kew.

Two sheets of leaves and fruits only. A plant from S.E. Borneo in Herb. Lugd. Bat. (*Winkler*, 2570), closely resembles this plant, and in its leaves and fruits the Celebes plant shows some similarity to *S. ovata* from the Philippines.

Strychnos sp.

Borneo. Sarawak, *Beccari*, 839.

Resembling *S. pubescens*, C. B. Clarke, in general appearances, but the leaves are trinerved. The flowers are imperfect. The material probably represents a new species.

Strychnos monosperma, *Miq.* in Flor. Med. Ind. ii. p. 351.

Java. Noesa Kambagan Is. No specimen has been seen, probably belongs to *S. Horsfieldiana*, 9, v.

Strychnos Kerstingii, *Gilg* et *K. Schum.* in Fl. Deutch. Sud See, p. 498.

New Guinea. Kaiser Wilhelm's Land, *Lauterbach*, 2401.

Species described from leaves and fruits only. Leaves oblong-lanceolate, attenuately and obtusely acuminate, trinerved; fruits one-seeded. Said to be very distinct in the shape of the leaves and small yellow fruits.

A. W. Hill.

XXXIX.—NOTES ON TREES SUITABLE FOR EXPERIMENTAL FORESTRY. II. AMERICAN BROAD-LEAVED TREES—*continued.*

W. Dallimore.

The Sugar Maple (*Acer saccharinum*, Wangenh.).—The important place occupied by this species amongst commercial timbers, warrants it a trial amongst possible timber trees in the British Isles, although it is of less vigorous growth than the Oregon and Norway Maples and the Sycamore. Hough, "American Woods," i, pp. 48–49, describes it as being one of the most useful trees of Canada, New England and the Middle States, its timber being employed for furniture, interior finish of houses, flooring, ship-building, shoe-lasts and wooden-ware. Further references to the uses of the wood are made in "Forest Planting Leaflet," Circular 95, U.S. Dept. of Agriculture, as follows :—"The wood of the sugar maple is heavy, strong, dense, and very hard, but not durable in contact with the soil. It is susceptible of fine polish and is used in large quantities for interior finish, floors, musical instruments, furniture, wooden ware, vehicles, cooperage, and novelties. The wood stands alternate wetting and drying well, and is therefore one of the best for the manufacture of washing machines. 'Curly' and 'Bird's-eye' maple obtained from this species, are desirable for finishing and cabinet work. The wood makes charcoal of unsurpassed quality, is a source of wood alcohol, and has a very high fuel value."

"The chief value of the sugar maple for economic planting is as a sugar producer. The sap contains from 2 to 3 per cent. of sugar. Three to 9 per cent. of the total sap content of the tree may be utilized for sugar-making without dangeronsly lessening the tree's vitality."

The species is of slow growth in America, its average height growth being about one foot a year for the first 30 or 40 years and less afterwards. It occurs in pure stands and also in mixed woods. Being a good shade-bearer, American foresters employ it for planting beneath light-demanding subjects when it is to be grown for timber, and recommend its association with such trees as red oak, hickory, and yellow poplar. It is said to be unadapted for poor, dry ground, and to be sensitive to severe frost and drought, but is reported to stand wind, snow and ice well. When grown for sugar production it is planted wide so that the crowns may have plenty of room for development. An account of the growth of the tree for sugar production is to be found in "Bulletin No. 59," of the Bureau of Forestry, U.S. Dept. of Agriculture.

The average height of American grown trees is given as about 80 feet and the trunk diameter as 3 feet. It sometimes, however, grows 120 feet high with a diameter of 5 or 6 feet. According to the above mentioned forest circular it often forms from 25 to 75 per cent. of the total forest stand in the northern pine belt of America. A great deal of timber is imported into the markets of the British Isles, some ready worked in the form of flooring blocks for factories, work-rooms, &c., mangle rollers and other articles, and some as trunks and planks.

A small plantation of sugar maple was made a year or two ago on the Earl of Plymouth's estate at St. Fagans in South Wales, but it is yet too young for an opinion to be formed as to how it is likely to succeed.

The Red Maple (*Acer rubrum*, L.).—This is another species which provides a certain amount of the maple wood of commerce, and it is one which thrives in this country. It is found in Canada and the Eastern United States, as a tree up to 80 feet high with a trunk diameter of 4 feet. Its best proportions are attained along the banks of lakes and streams, where it often grows in ground of a swampy nature which is subject to occasional flooding. That it will grow on ordinary land is shown by the fine trees which are sometimes met with in this country, and growing in the hot sandy soil of Kew several trees of fair development are to be seen. A very fine tree is growing on the bank of the lake at Whitton Park, Hounslow.

Hough, "American Woods," iii., pp. 15–16, describes the wood as moderately heavy, hard and elastic, close-grained, compact and taking a very smooth polish. He adds that it is valuable for the manufacture of shovels, bowls, and small wooden-ware generally. The curly grain peculiar to the wood of *A. saccharinum* is sometimes developed in this wood also and such examples are esteemed for cabinet making. According to Hough, the bark also is of importance, for, by boiling it with sulphate of iron and alum a bluish-black dye is obtained. Boiled with alum alone the bark is said to produce a lasting cinnamon-colour dye.

The Hickories (*Carya* spp.).—Hickory wood of commerce is furnished by several species of *Carya* which may be grown in certain parts of the British Isles. The hickories are closely related to the walnuts and share with those trees the character of producing edible nuts. In America, the nuts of some kinds are of such importance that plantations of trees are made solely for their production. Pecan nuts, the produce of *Carya olivaeformis*, are imported into the markets of this country and are used for dessert. Hickory wood has a high reputation for strength and elasticity and is used for many of the purposes to which ash is put, such as handles for axes and other tools and for agricultural implements. It is also in request for carriage building and is popular in America for the manufacture of trotting sulkeys. In fact for the latter purpose it is said to be better adapted than any other known wood (*see* "Garden and Forest," September 25, 1889, p. 460).

Although good trees of a few species are to be found in the British Isles and young examples make satisfactory progress at Kew, the hickories have not been planted freely enough to warrant extensive plantations prior to experimental work. They are included among the trees which are under trial at Avondale in Ireland but the plantation is only of recent formation. Elwes, "Trees of Great Britain and Ireland," iii., p. 616, doubts their suitability for forest planting in the British Isles and supports his opinion with observations on the behaviour of various species which have been tried on the Continent. As far as he is aware, none of the trials which have been made in France, where the trees were introduced on a large scale by Michaux, 100 years ago, have been

successful, and he could not hear that any of the trees which were planted near Paris are now alive. But, as we are faced with the fact that no systematic trials have been carried out in this country, the possibility remains that one or more species may form useful timber trees and enable us to grow timber which has now to be imported.

In American literature, the Caryas are usually referred to under the name of *Hicoria*, and in the "Silva of N. America," vii., the various species are described under that generic name.

The following species are worthy of trial :—

THE SHELL-BARK or SHAG-BARK HICKORY (*Carya alba*, Nutt.).—The wood of this species is highly esteemed by manufacturers, and it is said to be one of the most valuable kinds of hickory. The common names of shell-bark and shag-bark refer to the habit which old trees have of shedding their bark in rough scales. This habit enables timber merchants to single out felled trees belonging to the species from amongst inferior kinds. Hough, "American Woods," ii., p. 26, refers to it as a very valuable wood for agricultural implements, the wheels and runners of vehicles, axe-helves, baskets, &c. He also says that its nuts are an important article of commerce and that most of the hickory nuts of the market are produced by this species.

Although rarely found as a pure forest, it covers an extensive area in America, for it is met with from the northern shores of Lakes Erie and Ontario, throughout the Middle States to Florida, N. Alabama, &c. Its associates, according to the "Forest Planting Leaflet," Circular 62, are other hickories, oaks, maples, ashes, chestnut, basswood, and yellow poplar. *Carya alba* grows best in a deep, rich and moist loam, and the above mentioned circular recommends that it should be planted in good soil in valleys and on fertile hill-sides. It is doubtful whether it would prove successful on shallow soil, for like other hickories, it is a deep-rooting tree. As it is a light-demanding tree, it should be planted as a pure plantation or be mixed with some shade-bearing subject such as beech, hornbeam, or sugar maple.

According to American reports it coppices well, and the young growths are used for splitting to make into baskets, barrel hoops, &c.

On account of young trees being difficult to transplant, it would be a good plan to sow the seeds where the trees are to grow, taking care first, to roll them in red lead to secure them from attacks by mice. If sown in a nursery, the young trees ought to be transferred to permanent quarters when not more than two years old. When planted as a mixture, the hickories might be placed about 8 feet apart each way. Attention to weeding will be required for two or three years after the formation of a plantation, for the young trees do not get on very fast in the early stages, and might easily be smothered by coarse vegetation.

One of the largest trees in the country is growing in the arboretum at Brocklesby Park, Lincolnshire. Its height last year was 79 feet, and its girth 4 feet 10 inches, at 5 feet from the ground. Other large trees referred to in "Trees of Great Britain and Ireland," iii, p. 603, are to be found at Botley Hill, Hants, and at

Boynton Hall, Bridlington, Yorks. At the former place a tree about 70 years old measures 75 feet in height by 5 feet 4 inches in girth, with a bole of 30 feet, while three trees on the latter estate are 50 feet by 7 feet, 40 feet by 4 feet, and 25 feet by 6 feet, respectively. Its average height in America is 70 to 90 feet, with a girth of from 6 to 10 feet, but trees have sometimes been found up to 150 feet high, with a girth of 15 feet.

THE BITTER-NUT (*Carya amara*, Nutt).—Although the timber of this species is considered by wood-workers to be inferior to that of the shell-bark hickory, it is used for many of the same purposes. Hough, "Handbook of Trees of the Northern States and Canada," p. 53, says that it is less fastidious than other species with regard to soil, and that it is more uniform in distribution, and probably the most abundant representative of its genus. Its maximum dimensions are attained in southern New England, where it grows to a height of 100 feet, with a girth of 10 or 12 feet. Usually, however, it is found between 70 and 80 feet high, and up to 9 feet in girth. There appears to be no reason to doubt that it will succeed in England, for Mr. Elwes has recorded several well-grown examples in "Trees of Great Britain and Ireland," iii, p. 601. A tree at Bute House, Petersham, when measured, in 1903, was 76 feet high, and 7 feet 5 inches in girth. At Arley Castle, the tallest of five trees was 72 feet high by 4 feet in girth, while at Barton, Bury St. Edmunds, two trees measured, in 1905, 80 feet by 5 feet 4 inches, and 74 feet by 7 feet 6 inches, respectively. The nuts, on account of their bitter taste, are reputed to be valueless, and squirrels, even, are said to ignore them so long as other food is to be found.

THE PIG-NUT (*Carya porcina*, Nutt.).—This is considered to be one of the hardiest of the hickories, and it ought to prove a useful one for forest planting. Hough, "Handbook of Trees of the Northern States and Canada," p. 65, says that it is found at higher altitudes than any other hickory inhabiting the uplands and ridges of the Northern States. Its average height is from 80 to 100 feet, and its girth from 9 to 12 feet. Its timber is of good quality, and is used for many purposes where toughness and strength have to be combined with lightness. The nuts are not considered so important as those of other species in America, on account of their thick shells and small kernels.

A tree 73 feet high, with a girth of 6 feet 2 inches, at 5 feet from the ground, may be seen near the south end of the Temperate House at Kew. It fruits freely most years, but many of the nuts are not fertile. From the way in which this tree has grown in poor sandy soil, there can be little doubt about its success in ground of better quality, if planted under forest conditions. It is probable that its chances as a forest tree in England could be gauged most satisfactorily by planting it alongside a plantation of ash, under exactly similar conditions.

THE KING-NUT OR BIG SHELL-BARK HICKORY (*Carya sulcata*, Nutt).—In many respects this species may be looked on as a counterpart of *C. alba*. It has the same peculiar habit of shedding its bark in long plates or strips, and the wood is of equally good quality. Attaining a height of 100 or 120 feet, with a diameter of from 3 to rarely 4 feet, Sargent, "Silva of N. America," vii, p. 159,

says that its best dimensions are attained on rich, deep, bottom lands which are inundated during several weeks each year. The orange colour of the young branches is given as a ready means of distinguishing the tree from other kinds. Hough, "American Woods," iii, p. 64, gives a description of the wood and refers to the nuts, which are said to possess a delicious flavour, and always to find a ready market. It might be tried under similar conditions to *C. alba*.

The Mocker-nut Hickory (*Carya tomentosa*, Nutt.) Like several of the other hickories this species produces timber of first-rate quality, whilst its nuts constitute such an important article of trade that it is grown for their production as well as for timber. It is found between 90 and 100 feet in height with a girth of from 9 to 12 feet, inhabiting the middle and southern States from the coast westwards to Nebraska and Kansas. Its maximum growth takes place in rich upland valleys and on gentle slopes; towards the more northerly parts of its range, it is confined to the neighbourhood of the coast. The best specimen at Kew may be seen near the Azalea Garden. It was planted in 1872, and is now 49 feet high, with a girth of 2 feet 5½ inches at 5 feet from the ground. The leaves of many of the Caryas, and of this one in particular, are very effective in autumn, for they assume a rich golden colour previous to falling. This desirable quality suggests them as good subjects for massing in places where landscape effect has to be studied.

American Oak (*Quercus* spp.). Although some 50 or 60 species of *Quercus* are natives of N. America, very few are ever likely to enter largely into competition with British oaks in our woodlands, for, generally speaking, the wood is no better than English oak, if as good, and the same quality of land would be required to grow it as is necessary for the production of good English oak. The best American oak is produced by a number of species which are known collectively as "white oaks." White oak timber holds an important position amongst United States timbers, and a good account of its uses, &c., is to be found in "Forest Service Circular," 105, of the U.S. Dept. of Agriculture, "White Oak in the southern Appalachians." It is there stated that its annual cut is over 2,000,000,000 board feet, and that it forms 49 per cent. of the total annual cut of hardwoods in the southern Appalachian region. *Q. alba* is the most important tree in the group, which includes such species as *Q. macrocarpa* and *Q. bicolor*. The principal uses for white oak appear to be ship and waggon building, furniture, cross-ties for railroads and staves for barrels. White oaks, as a rule, grow unsatisfactorily in this country, hence the necessity for exercising caution in the formation of plantations.

Other classes of American oak are known as "red oak" and "black oak." Some of the species which produce these classes, grow satisfactorily in this country, but the timber is inferior to that of the white oak, and might be classed with that of the Turkey oak for quality, rather than with that of the British species.

The following species, however, deserve a trial in our woods.

The Burr Oak (*Quercus macrocarpa*, Michx.). It is probable that this species will prove more satisfactory than others of the

white oak group for cultivation in this country, though in special places where the atmosphere is moderately humid, and the ground good and moist; the "white oak," *Q. alba*, L., and the "swamp white oak." *Q. bicolor*, Willd., may prove a success. The burr oak grows to a large size in Central N. America, its average height being from 80 to 90 feet, with a diameter of 3 to 4 feet, though under very favourable conditions specimens have been noted up to 170 feet in height, with a diameter of from 6 to 7 feet. "Forest Planting Leaflet," Circular 56, U.S. Dept. of Agriculture, deals with this species, and from it the following notes have been extracted. "The burr oak is one of the most valuable hardwood trees in North America. The wood is heavy, hard, very strong and durable. In the markets it is not, and need not be, distinguished from white oak, and it is used for the same purposes. The heartwood makes especially good fence posts and railroad ties, but the sapwood does not last long in the ground. It is best suited to deep, rich, river-bottom soils. It will maintain itself in poorer upland localities, but it is recommended for planting only where the soil is fairly good, moist, and well-drained, and where protracted droughts are infrequent. It is rather intolerant of shade, and will not thrive beneath the crowns of taller trees. The rate of growth, except under the best conditions, is somewhat slow, and is about like that of white oak. Neither grows so rapidly as red oak. The burr oak is subject to comparatively few pests or diseases." In America, regeneration takes place by growths from the stools of trees which have been carefully felled, and also from seeds which are often sown on the ground the trees are to occupy. A full description of this and other white oaks may be found in vol. viii. of the Silva of N. America.

The Red Oak (*Quercus rubra*, L.).—This strong-growing species thrives in many parts of the country, increasing in size at about the same rate as the Turkey oak. Timber from British-grown trees is reddish in colour and of attractive appearance, but it lacks the strength of good English oak. American reports of the timber describe it as heavy, hard, coarse-grained, strong, and moderately durable. It is said to be inferior to white oak where great strength is required, and not to last so long in the ground, but to work easier and to be often preferred for interior finish and for cabinet work. As a rule it is considered to be better than other kinds of red oak, and the best qualities are not kept separate from white oak for many purposes. (*See* "Forest Service Circular," 58, U.S. Dept. of Agriculture.) In the sandy soil of Kew it makes satisfactory progress. When grown in the open the head is inclined to become very wide in comparison to the height and even in a thin wood the same thing is apparent, therefore, it is probable that the best results would be obtained by planting it thickly with beech or some other shade-bearing tree for a companion. The largest tree at Kew has a girth of 13 feet 10 inches at 5 feet, and is now about 55 or 60 feet high. It has, however, been lopped. Younger trees range up to 85 feet high with trunks up to 6 feet in girth. Two vigorous examples were noted recently in the gardens at Ancrum House, Roxburghshire, the residence of Miss Scott. The larger specimen was 55 feet high, and 7 feet 6 inches in girth at 5 feet from the ground.

With reference to the growth of red oak in America, the aforementioned circular gives the following information :—

"Red oak is best suited to porous, sandy or gravelly clay soils. In this requirement it is intermediate between the white oaks and several of the black oak group. It requires well-drained soil always, but does not do well where the air is very dry. The tree is intolerant of shade, except when very young, and must always be allowed to keep its crown free. Red oak surpasses all other oaks in the rapidity of its growth, and is therefore a good tree to plant where conditions are suitable. Like the other oaks, this species is not subject to disease nor to serious insect attacks, and is rarely overthrown by wind."

Under normal conditions, *Q. rubra* grows from 70 to 90 feet high with a trunk diameter of from 2 to 4 feet, but it has been recorded up to 150 feet high with a diameter of 5 feet.

The Cottonwood (*Populus monilifera*, Ait.).—The usefulness of the better grades of poplar wood for box-making and for paper pulp is such as to warrant extensive plantations of those kinds which grow rapidly and produce good timber. *P. monilifera*, or *P. deltoidea* as it is often called, is likely to prove one of the best of the species for it occupies an important place amongst American woods. "Circular 47," of the Forest Service, U.S. Dept. of Agriculture, deals with the strength of packing boxes made from various kinds of wood, and of eight sorts mentioned for medium sized boxes and six sorts for large boxes, cottonwood was found to be the strongest. For small boxes cottonwood was second of eight. The kinds tried were cottonwood, red gum, yellow pine, New England white pine, Western hemlock, Western spruce, Michigan white pine, and North Carolina pine.

Populus monilifera is widely distributed from Quebec, southwards through the Atlantic States to western Florida and westward from Alberta, along the Rocky Mountains to New Mexico. Like other poplars it is of rapid growth when planted on moist ground, and is an excellent tree for low ground which is subject to flooding. Its average height is given as from 75 to 100 feet and the diameter of the trunk as from 2 to 3 feet. The United States "Forest Circular," 77, refers to the economic uses of the wood as follows:—"Paper pulp, boxboards, backing for veneer, the unexposed parts of furniture, wagon boxes, interior woodwork and boarding, and fuel are the principal products for which the wood is used. The increased value which the tree is gaining for these uses, coupled with the ease and rapidity with which it can be grown, renders it one of the important species for commercial planting in the Middle West. Its fuel value in some regions is especially high, since it furnishes a greater amount of wood in a given time than other species. In proportion to volume, the relative heat-production is, however, low."

P. monilifera would need to be planted as a pure stand, or with spruce, on moist ground. It would probably grow on high, dry ground, but it is doubtful whether it would ever prove a commercial success. Cuttings form the most satisfactory method of increase. These may either be dibbled into permanent positions or be rooted

in a nursery. Male flowering trees are preferable to female, for when the latter are fruiting, the cottony fibre which surrounds the seeds is apt to become objectionable.

Populus Eugenei, Simon-Louis.—Although there are several species of poplar which are, or may be, grown successfully in this country, experiments might well be directed towards ascertaining whether some of the hybrids, on account of more robust growth, would not be more profitable. Cultivated as ornamental trees they are certainly more vigorous than their parents and it is quite possible that they would produce a given amount of timber of equal or better quality in a shorter space of time. The hybrids are probably of natural origin, but, until recently, they have been considered to be varieties of certain species, or have been distributed as good species. Their identity has, however, been worked out by Henry and others, and they have been proved pretty conclusively to be hybrids between the European *P. nigra*, L. and one of the American species, *P. monilifera*, Ait., or *P. angulata*, Ait.

P. Eugenei is likely to prove one of the best of these hybrids for forest planting, for it is of sturdy, pyramidal habit, with a narrow head of small branches. It grows rapidly and will apparently arrive at a marketable age in 30 or 40 years from the time of planting. Growing in poor sandy soil at Kew, which often becomes very dry—by no means ideal conditions for poplars—a tree planted in 1888 is now 95 feet high, 7 feet in girth near the ground, and 4 feet 10½ inches at 5 feet high. It is a male plant and would of course have to be increased by means of cuttings. Pure stands on moist ground would doubtless be more economical than mixed woods and the trees might be planted from 3 to 4 feet apart each way. Like other poplars it is well adapted for the banks of lakes and streams, hence its suitability for plantations on marshy ground.

P. serotina, Hartig, *P. regenerata*, Hort., *P. marilandica*, Bosc. and *P. robusta*, Schneider, are other vigorous-growing hybrids, which, when grown in the open, develop wide-spreading heads of branches. Some of them are already in cultivation included under the general term of black Italian Poplar. All are worth trying in experimental blocks.

XL.—DIPENTODON.

A New Genus of Uncertain Systematic Position.

S. T. Dunn.

In 1898 Mr. Augustine Henry sent to Kew from Mengtze in Yunnan, where he was then stationed as Commissioner of Customs, specimens of the foliage and young fruits of a small tree growing in the forests which covered the mountains to the south of that town. The specimens exhibited such unusual floral characters that there arose some doubt, which further study failed to remove, as to what Natural Order or even as to what Series of the Dicotyledons could be expected to contain its allies. The material was, in fact, not sufficiently complete to enable the question to be decided until, among some specimens from the Province of

Kweichau communicated to Kew by Mgr. Léveillé, Perpetual Secretary of the Academie Internationale de Géographie Botanique, was found excellent and abundant material of the same species in flower and fruit.

Even with the complete series of specimens now available, approximately close allies have not been found, but it has been placed provisionally, as a new genus, among some anomalous monotypic genera in *Celastraceae*. The name *Dipentodon*, proposed for it, refers to the most remarkable character possessed by the flowers in the exact similarity of the calyx teeth and petals (if I rightly call them so) and their insertion so nearly in one whorl that the appearance is given of a ten-toothed perianth.

Dipentodon, *Dunn*, gen. nov. [Celastraceae-Elaeodendreae ?]; ob ovarii indolem *Tripterygio*, Hook. f., comparabile.

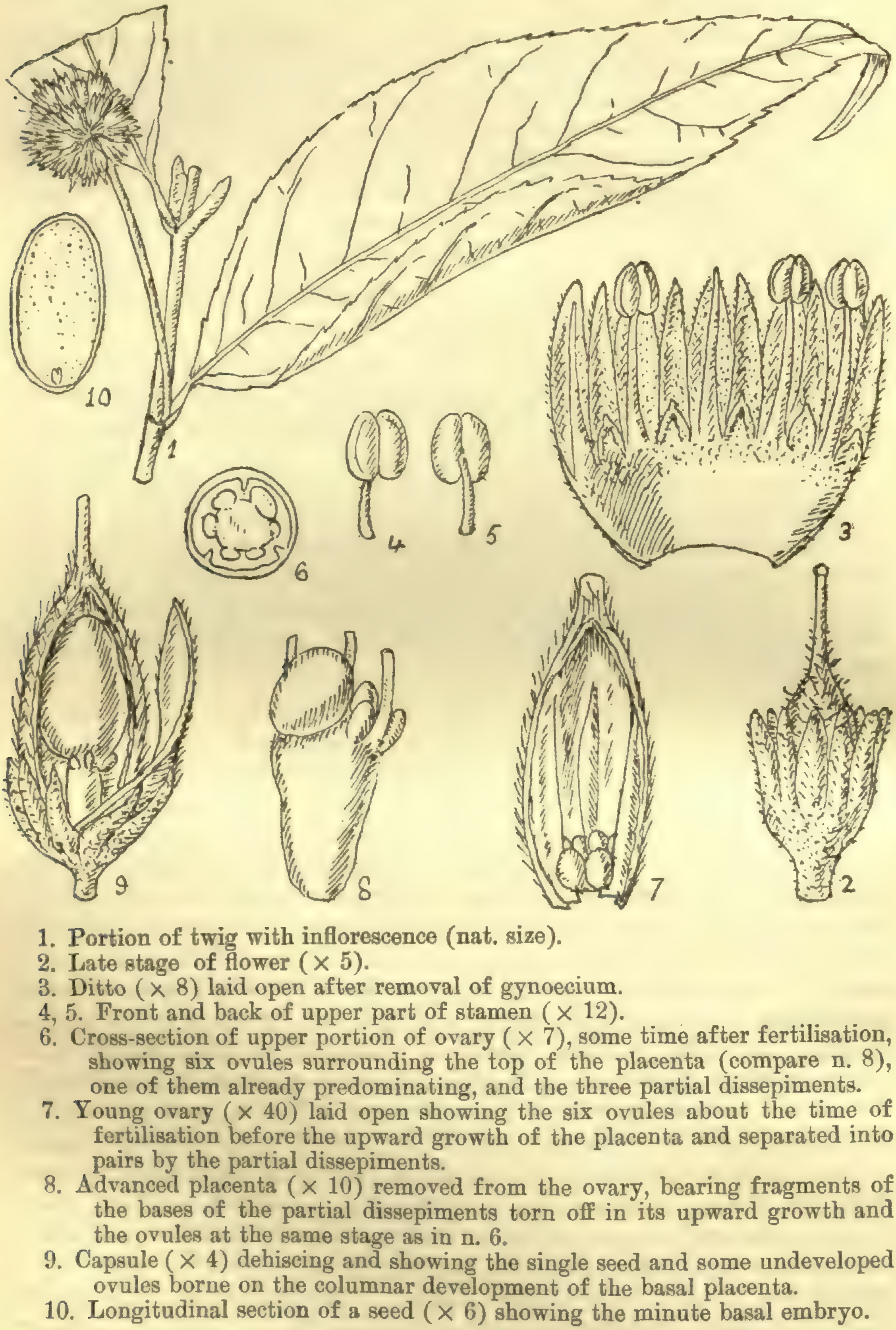
Calyx 5-fidus; tubus urceolatus, disco adhaerens; lobi erecti, ligulati, aestivatione aperti. *Petala* 5, calycis lobis omnino similia. *Stamina* 5, disco inserta, calycis lobis opposita, glandulis alternantia, filamentis filiformibus, antheris didymis. *Ovarium* liberum, basi 3-loculare, apice 1-loculare, in stylum integrum attenuatum; ovula in loculis imperfectis 2, erecta. *Capsula* septicide dehiscens, obtuse 3-gona, stylo terminata, coriacea, septis evanidis 1-locularis. *Semen* erectum, testa carnosa. *Embryo* minutus, intra basin albuminis situs, rectus, cylindricus, axilis.—*Arbores* parvi. *Folia* alterna, petiolata, serrulata, stipulata. *Umbellae* parvae, pedunculatae, axillares.

1909

D. sinicus, *Dunn* (species unica).

Arbor parva, ramulorum cortice siccitate nigra. *Folia* alterna, lanceolata, in acumen longum gradatim angustata, basi breviter acuminata, ad 14 cm. longa, per totam marginem regulariter calloso-serrulata, papyracea, primum in costa subtus pubescentia, mox praeter basin glabra, tandem omnino calva, nervis utrinque 7–9; petioli 3–6 mm. longi; stipulae membranaceae, lanceolatae, 5–7 mm. longae, caducissimae. *Umbella* longipedunculata, globosa, 25–30-flora, 1–1·5 cm. diametro, 4–5 bracteis ovatis caducis involucrata; pedunculus axillaris, 2·5–3·5 cm. longus, pubescens. *Flores* luteoli, parvi, 2 mm. longi, primum dense pubescentes, diu fere glabri; pedicelli puberuli, 3 mm. longi, post anthesin elongati, medio articulati. *Calycis* campanulati laciniae 5, aestivatione apertae, primum irregulariter inflexae, tandem erectae, ligulatae, apice rotundatae, tubum bis excedentes. *Petala* 5, cum calycis laciniis simillimis alternantibus specie in serie una inserta. *Stamina* 5 erecta, sub anthesi calyce paullo longiora. *Disci* glandulae quartam partem calycis laciniarum aequantes, apiculatae. *Ovarium* ellipticum, ad basin apicemque angustatum, superne in stylum integrum ovario paullo breviorem angustatum, pilis longis lanosis vestitum, imperfecte 3-loculare, stylo glabro apice rotundato; ovula in loculorum basibus per paria erecta. *Capsula* e calyce longe exserta, elliptica, in stylum abrupte angustata, praeter stylum 6–9 mm. longa, breviter velutina, unilocularis; valvae 3, coriaceae. *Semen* unicum, anguste ellipticum, 4–5 mm. longum, brunneum, in placenta centrali post anthesin elongata 2 mm. longa ovulis abortivis et septorum vestigiis coronata sedens.

China. Yunnan: Mengtze, S. Mountain Forests, 1800 m., *Henry*, 10,741; Kweichau: Long-Ly, *Cavalerie*, 2995; Kiang-ouang: Pin-fa, *Cavalerie*, 2353; Majo, *Cavalerie*, 3313.



1. Portion of twig with inflorescence (nat. size).
2. Late stage of flower (× 5).
3. Ditto (× 8) laid open after removal of gynoecium.
4, 5. Front and back of upper part of stamen (× 12).
6. Cross-section of upper portion of ovary (× 7), some time after fertilisation, showing six ovules surrounding the top of the placenta (compare n. 8), one of them already predominating, and the three partial dissepiments.
7. Young ovary (× 40) laid open showing the six ovules about the time of fertilisation before the upward growth of the placenta and separated into pairs by the partial dissepiments.
8. Advanced placenta (× 10) removed from the ovary, bearing fragments of the bases of the partial dissepiments torn off in its upward growth and the ovules at the same stage as in n. 6.
9. Capsule (× 4) dehiscing and showing the single seed and some undeveloped ovules borne on the columnar development of the basal placenta.
10. Longitudinal section of a seed (× 6) showing the minute basal embryo.

Dipentodon, as has been mentioned, is characterised by a combination of structural peculiarities that does not find an even approximate counterpart in any other genus known to me, and the discovery of the Natural Order to which it is most nearly allied has therefore presented considerable difficulties. The situation has, moreover, been complicated by the ambiguous character of

the outer floral whorl and of the androecium. The outer covering of the flower appears at first sight to have 10 similar ligulate teeth, and these may be regarded as 5 sepals and 5 petals or as 10 sepals, the petals being absent. The staminal whorl is also capable of two explanations, according as the 5 glands alternating with the stamens are considered to be reduced members of a decamerous androecium or merely as projections of the disc.

The ten teeth of the perianth though quite similar and apparently in one row can, in the young bud, be distinctly seen to form an inner and outer whorl and even up to maturity the edges of five of the teeth are slightly within those of the alternate ones. It may be said therefore that these two whorls represent a calyx and a perigynous corolla. The position of the stamens opposite to the outer members or calyx segments is in accordance with that view.

The diagnosis of the genus has been drawn up upon the above interpretation of these whorls and will allow of its being placed provisionally in *Celastraceae* near *Tripterygium* with which it is in close agreement regarding ovary characters.

It is true that *Dipentodon* differs in several structural points from the greater part of the *Celastraceae* but each peculiarity is shared by one at least of the genera comprised by Bentham and Hooker in that Natural Order. The similarity of the calycine whorl to the corolla and their open aestivation is paralleled by some species of *Perrottetia*; the five glands of the disc, if taken to represent a step towards a decamerous androecium throw light upon the position of *Glossopetalum*, which, with its ten stamens, has hitherto held an unique position in the Natural Order; the septicidal dehiscence of the capsule is unusual but closely resembles that of *Microtropis* and perhaps of other allied genera in which a single seed results from a plurilocular ovary; the curious growth of the placenta beneath the six basal ovules, in consequence of which the seed is at length borne on a short stalk within the capsule is similar to that which occurs in *Kurrimia*; the stipules and the umbellate inflorescence agree with the monotypic S. American genus *Goupia*.

If *Dipentodon* is rightly placed in *Celastraceae* at all, it is only in consequence of its connection with the main body of that Natural Order through the genera *Tripterygium*, *Perrottetia*, *Kurrimia* and *Goupia*. These differ among themselves as much as they do from the greater part of the rest of *Celastraceae*, and it is among the isolated groups which they form on the fringe of the Order that *Dipentodon* may be provisionally left.

The anatomical characters have been examined by Mr. Boodle but do not appear to give any clear indication of the affinities of the genus.

XLI.—DIAGNOSES AFRICANAE: XLIV.

1281. **Mesembryanthemum oculatum**, *N. E. Brown* [Ficoideae-Mesembryeae]; affine *M. viridifloro*, Ait., sed ramis multo brevioribus, foliis confertioribus, floribus albis rubro-oculatis differt.

Herba perennis, subcaespitoso-ramosa, papulata, ramis 2–6 cm. longis procumbentibus. *Folia* 0·7–3 cm. longa, basi 4–6 mm. lata, deinde ad apicem obtusum augustata, supra leviter concavo-

canaliculata, obtusissime vel tessellato-papulata, glabra, viridia. *Flores* terminales, solitarii, brevissime pedunculati. Calyx inaequaliter 5-lobus; tubus obconicus, papillosus (nec papulatus); lobi deltoideo-ovati, papulati. *Petala* laxe multiseriata, exteriora 1 cm. longa, linearia, acuta, radiata, interiora gradatim breviora, intima erecta, staminodiiformia, omnia alba, basi rubra. *Stamina* erecta, stylis longiora, antheris luteis.

South Africa. Described from a living plant, which flowered at Kew in June, 1911, collected during the Percy Sladen expedition to Little Namaqualand in 1910 by *H. H. W. Pearson*, 6172.

1282. **Dicliptera Rogersii**, *Turrill* [Acanthaceae-Acanthoideae]; affinis *D. micranthae*, Nees, sed bracteis bracteolisque dense glandulosis, corolla majore, seminibus laevibus valde distincta.

Caulis erectus, ramosus, parce pubescens, angularis. *Folia* pauca, lanceolata, apice acuta, parce vel in nervis densius pubescentia, petiolis 0·5 mm. longis. *Cymae* capitatim congestae, subglobosae vel ovoideae, multiflorae, in ramis terminales et paucae distantes axillares, quasi in paniculam laxam subdivaricatam collectae; bracteae oblongo-spathulatae, acuminatae, 8 mm. longae, 1·5 mm. latae; bracteolae lanceolatae, 6 mm. longae, 0·75 mm. latae, bracteis bracteolisque dense glanduloso-pubescentibus. *Calycis* lobi 5, lineares, acuti, 4 mm. longi, minute pubescentes. *Corollae* tubus cylindricus, 9 mm. longus, 1 mm. diametro, extra parce pilosus; labium posticum integrum, 6 mm. longum, 4 mm. latum, anticum trifidum, 7 mm. longum, 3·5 mm. latum. *Stamina* 2, filamentis exsertis 10 mm. longis fere glabris; antherarum loculi 2, superpositi, subglobosi; pollinis granula ellipsoidea circiter 40 μ longa. *Discus* 0·75 mm. altus. *Ovarium* ad 1·5 mm. altum, 0·75 mm. diametro, glabrum, loculis 2-ovulatis. *Stylus* 1·6 cm. longus, glaber. *Capsula* 5-6 mm. longa, 1·5 mm. lata, apice minute glandulosa. *Semina* 4, orbicularia, laevia.

Tropical Africa. Mozambique District: N.-W. Rhodesia; Kalomo, *Rogers*, 8249.

1283. **Phyllanthus Dusenii**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. Welwitschiano*, Muell. Arg., sed caulibus alatis, foliis lineari-lanceolatis et sepalis oblanceolato-spathulatis differt.

Caules circiter 30 cm. alti, e rhizomate perenni orti, paullo flexuosi, puberuli, internodiis approximatis 5 mm. longis; ramuli floriferi caulium apices versus conferti, patuli, usque ad 13 cm. longi, conspicue alati, minute puberuli. *Folia* lineari-lanceolata, basi rotundata vel subcuneata, apice minute mucronata, 1·3–2 cm. longa, 3–6 mm. lata, membranacea, utrinque glabra, nervis lateralibus utrinque 7–9 prope marginem arcuatis subtus prominentibus; petioli paullo crassi, 1 mm. longi, glabri; stipulae elongato-lanceolatae, acutissimae, 2·5 mm. longae, glabrae. *Flores* monoici, solitarii, ♂ numerosi in ramulis inferne dispositi, ♀ solitarii in axillis foliorum superiorum dispositi; pedicelli breves, ♀ leviter alati. *Flores* ♂: *Sepala* 6, oblanceolato-spathulata, 1-nervia, marginibus membranaceis, 2·5 mm. longa. *Disci glandulae* 6, parvae, prominenter verrucosae. *Stamina* 3, filamentis in columnam longam gracilem connatis; antherae inter se liberae, loculis parallelis contiguis longitudinaliter dehiscentibus. *Flores* ♀: *Sepala* maris sed longiora, 4 mm. longa, 1 mm. lata. *Discus* parvus, annularis,

paullo undulatus, glaber. *Ovarium* subglobosum, laeve, leviter stipitatum ; styli erecti, basin versus connati, bifidi vel fere bilobi, apicibus non incrassatis. *Capsula* matura non visa.

Tropical Africa. Upper Guinea : Cameroons ; without precise locality, *Dusén*, 296.

1284. **Phyllanthus Gossweileri**, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *P. omahakensi*, Dinter et Pax, caulibus laevibus, stigmatibus non incrassatis differt.

Herba annua, circiter 30 cm. alta ; caulis et rami teretes, glabri ; ramuli floriferi elongati, usque ad 15 cm. longi. *Folia* lanceolata vel oblongo-lanceolata, basi paullo rotundata, apice acuta, 6–12 mm. longa, 2–3 mm. lata, crassa, utrinque glabra et opaca, nervis lateralibus utrinque obscuris ; petioli brevissimi ; stipulae subulatae, 1 mm. longae. *Flores* monoici. *Flores* ♂ basin versus ramulorum 2–3-nati, axillares. *Sepala* 6, obovata-elliptica, apice rotundata, glabra, marginibus leviter membranaceis. *Disci glandulae* 6, parvae, rotundatae, laeves. *Stamina* 3 ; filamenta connata ; antherae liberae, loculis subparallelis longitudinaliter dehiscentibus. *Flores* ♀ in axillis foliorum superiorum solitarii ; pedicelli 2 mm. longi : *Sepala* 6, oblongo-elliptica, apice rotundata, marginibus membranaceis, 2·5 mm. longa, 1·5 mm. lata, integra, glabra. *Discus* parvus, paullo 5–6-lobatus. *Ovarium* leviter lobatum, laeve ; styli ascendentes, bilobi, apice non incrassati. *Capsula* paullo depresso-globosa, 4 mm. diametro, laevia. *Semina* 2 mm. longa, dorso longitudinaliter 8-striata.

Tropical Africa. Angola : Kassuango Kurini, a weedy herb occurring here and there in open thickets, *Gossweiler*, 4198.

1285. **Phyllanthus Kaessneri**, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *P. sepiali*, Muell. Arg., sed filamentis liberis differt.

Frutex, ramis teretibus cortice cinereo-fusco ; ramuli floriferi fasciculati vel rare solitarii in ramis pulviniformibus producti, gracillimi, teretes, glabri, folios circiter 5-jugos gerentes. *Folia* obovata vel obovato-elliptica, apice rotundata et interdum leviter emarginata, basi subcuneata, 5–8 mm. longa, 3–5 mm. lata, tenuissime chartacea, in sicco supra flavo-brunnea, subtus glauca, utrinque glabra et conspicue reticulata, nervis lateralibus utrinque 4–5 utrinque distinctis ; petioli 0·5 mm. longi, glabri ; stipulae oblique lanceolatae, rubrae, petiolis aequilongae, marginibus laceratis. *Flores* monoici, ♂ solitarii, ♀ bini in axillis foliorum ; ♂ pedicelli graciles, 4–6 mm. longi, glabri, ♀ robustiores, 2 mm. longi. *Flores* ♂ : *Sepala* 6, distincte 2-seriata, exteriora parva, ovata, obtusa, interiora obovata, 1 mm. longa, 0·75 mm. lata, omnia carnosa vel coriacea, 1-nervia, glabra. *Disci glandulae* 6, leviter stipitatae, carnosae, rotundatae, laeves. *Stamina* 3, ad basin libera ; filamenta gracilia ; antherarum loculi divergentes. *Flores* ♀ : *Sepala* maris. *Discus* annularis, subinteger. *Ovarium* ovoideum, leviter lobatum, laeve ; styli suberecti, e basi liberi, bilobi, lobis linearibus apice non incrassatis. *Capula* non visa.

Tropical Africa. British East Africa : Pemba River, *Kässner*, 356.

1286. **Phyllanthus leucocalyx**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. niruroidi*, Muell. Arg., a quo disco floris ♀ crenulato, stigmatibus globosis recedit.

Caules graciles, lignosi, teretes, glabri; ramuli floriferi graciles, elongati, ad 15 cm. longi, teretes, glabri. *Folia* oblonga vel oblongo-elliptica, apice conspicue mucronata, basi obtusa et leviter rotundata, 6–8 mm. longa, 2–3·5 mm. lata, tenuia, marginibus recurvatis, utrinque glabra, nervis lateralibus utrinque 5–6 subtus distinctis supra obscuris; petioli brevissimi; stipulae subulato-filiformes, 2 mm. longae. *Flores* monoici, ♀ in axillis superioribus solitarii, ♂ in axillis inferioribus circiter 3-nati; pedicelli breves, glabri, ♀ quam ♂ robustiores. *Flores* ♂ : *Sepala* 5, obovato-elliptica, late 1-nervia, glabra. *Disci-glandulae* 5, magnae, planae, conspicue verrucosae. *Stamina* 3; filamenta in columnam gracilem connata; antherae inter se liberae. *Sepala* ♀ quam maris majora, penninervia, obovato-elliptica, 3 mm. longa, 1·5 mm. lata, glabra. *Discus* tenuis, crenatus, glaber. *Ovarium* globosum, conspicue verrucosum; styli erecti, longi, graciles, bilobi, stigmatibus globosis. *Capsula* 3 mm. diametro, superne valde verrucosa. *Semina* dorso arcte 14-sulcata.

P. rotundifolius, var. *leucocalyx*, Muell. Arg. in DC. Prod. xv., pt. 2, p. 406, partim.

Tropical Africa. Zanzibar, *Hildebrandt*, 1042a*; German East Africa: Pangani, *Stuhlmann*, 185; Rovuma Bay, *Kirk*; Nyika Country, without precise locality, *Wakefield*.

This species is easily distinguished from *P. rotundifolius*, Klein ex Willd., with which it was associated by Müller, by the long, slender styles, globose stigmas and warted ovary.

1287. **Phyllanthus parvus**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; ab omnibus speciebus africanis adhuc descriptis foliis linearibus, staminibus 2 valde distinctus.

Annua parva, 10 cm. alta; caulis gracilis, teres, ruber, glaber; ramuli floriferi ad 4 cm. longi, subteretes, glabri. *Folia* linearia, subacuta, 8–10 mm. longa, 1·5–2·5 mm. lata, membranacea, supra viridia, subtus pallide rubra, marginibus recurvatis rubris; petioli breves; stipulae subulatae vel fere filiformes, 1 mm. longae, integrae. *Flores* monoici, axillares, breviter pedicellati, ♀ in axillis superioribus solitarii, ♂ in axillis inferioribus 2–3-nati. *Flores* ♂ parvi: *Sepala* 5, obovata, integra, glabra. *Disci glandulae* 5, parvae, rotundatae, fere laeves. *Stamina* 2; filamenta ad apicem connata; antherae oblique dehiscentes. *Flores* ♀ : *Sepala* 5, uniseriata, oblanceolata, acuta, 1·5 mm. longa, glabra, costa lata, marginibus membranaceis serrulatis. *Discus* patelliformis, tenuis, leviter undulate lobatus, glaber. *Ovarium* subglobosum, paullo lobatum, laeve; styli breves, patuli, bifidi, stigmatibus non incrassatis. *Capsula* depresso-globosa, 2 mm. diametro. *Semina* dorso laevia.

Tropical Africa. German East Africa: between Lakes Tanganyika and Rukwa, about 1830 m., *Nutt*.

1288. **Phyllanthus Paxii**, *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. glaucophyllo*, Muell. Arg., foliis minoribus acute mucronatis, sepalis 5, filamentis connatis differt.

Suffrutex; caules erecti, gracillimi, lignosi, teretes, glabri; ramuli floriferi distantes, usque ad 11 cm. longi, gracillimi, teretes,

glabri. *Folia* lanceolata vel elliptico-lanceolata, utrinque angustata, apice acute mucronata, 4–12 mm. longa, 2–4 mm. lata, tenuiter chartacea, utrinque glabra, nervis lateralibus utrinque circiter 11 subtus conspicuis; petioli 1 mm. longi, paullo carnosi; stipulae subulatae, quam petioli paullo longiores. *Flores* monoici, axillares, ♀ solitarii, ramulorum apices versus pauci, ♂ geminati in axillis inferioribus dispositi; ♂ pedicelli graciles, breves, ♀ robusti, apicem versus incrassati, circiter 4 mm. longi, glabri. *Flores* ♂: *Sepala* 5, oblongo-elliptica, obtusa, 1·5 mm. longa, inconspicue 1-nervia, marginibus membranaceis. *Disci glandulae* 5, parvae, prominenter verrucosae. *Stamina* 3; filamenta connata; antherae leviter connatae, loculis parallelis longitudinaliter dehiscentibus. *Flores* ♀: *Sepala* 5, ovata, obtusa, 3 mm. longa, 1·5 mm. lata, paullo coriacea, glabra, marginibus membranaceis integris. *Discus* patelliformis vel cupularis, tenuis, margine crenulatus. *Ovarium* profunde lobatum, laeve; styli leviter divergentes, profunde bifidi, stigmatibus non incrassatis. *Capsulae* maturae non visae.

Tropical Africa. North Nyasaland, *Whyte*.

1289. **Discoglypremna**, *Prain*, gen. nov. [Euphorbiaceae-Crotoneae]; genus distinctum *Malloto*, Lour., quam maxime affine, differt tamen antheris more *Podadeniae*, Thw., prope apicem dorsifixis, filamentis glandulis receptacularibus interstaminalibus immixtis, antherarum loculis distinctis intus locello minore consociatis a connectivo conico prominente pendulis; a generibus ambobus ob discum hypogynum manifeste evolutum facillime sejungendum.

Flores dioici, apetali. Fl. ♂: *Calyx* in alabastro globosus, clausus, per anthesin valvatim 5-partitus. *Stamina* 7–8, receptaculo convexo affixa, filamentis liberis glandulis plurimis apice hirsutis consociatis; antherae prope apicem dorsifixae, loculis distinctis inaequaliter didymis a connectivo prominente conico pendulis, longitudinaliter dehiscentibus. *Ovarii rudimentum* 0. Fl. ♀: *Calyx* 5-sectus, segmentis valvatis demum reflexis. *Ovarium* 3-loculare; styli distincti, recurvo-patentes, indivisi, intus fimbriati; ovula in quoque loculo solitaria. *Discus hypogynus* majusculus, e squamis 6–8 apice hirsutis compositus. *Capsula* 3-dyma, in coccos 2-valves dissiliens. *Semina* ovoidea, arillo pulposo involuta; testa crassa, dura, nigra, nitidula, foveolata; tegmen distinctum; albumen carnosum; cotyledones suborbiculares, basi parum cordatae, planae.—Arbor. *Folia* alterna, petiolata, glabra, basi trinervia ibique supra minute 2-glandulosa. *Spicae* utriusque sexus ad apices ramorum paniculatae. *Flores* minuti, ♂ secus rhachin glomerati, ♀ sub quaque bractea solitarii; pedicelli utriusque sexus articulati; bracteae minutae. *Capsula* parce pubescens.

D. caloneura, *Prain* (sp. unica). *Arbor* 15–20 metralis; ramuli glabri vel glabrescentes. *Folia* petiolata, alterna, firmula, oblonga vel rotundato-oblonga, saepe breviter caudato-acuminata, basi cuneata vel subrotundata, margine integra vel obscure dentata, 7–10 cm. longa, 5–6 cm. lata, utrinque glabra vel subtus secus nervos parce puberula in angulis intercostalibus subtus foveolata, basi 3-nervia ibique supra minute 2-glandulosa, glandulis puberulis; petiolus 4–5 cm. longus, parce puberulus, supra canaliculatus. *Flores* subspicati, spicis in paniculas terminales 15–20 cm. longas, 7–10 cm. latas dispositis; rhachides puberulae. ♂ *Calyx* globosus,

extra puberulus, dein valvatim 5-partitus, 1–1·5 mm. latus. *Stamina* 7–8, filamentis gracilibus apice subulatis longe exsertis, glabris, glandulis receptacularibus plurimis plus minusve inaequalibus apice hirsutis consociatis ; antherae prope apicem dorsifixae, loculis distinctis 2-locellatis a connectivo prominente conico pendulis, locellis inaequalibus introrsis minoribus. ♀ *Calyx* extra puberulus, 5-sectus, segmentis valvatis reflexis. *Ovarium* 3-loculare, hirsutum ; styli distincti, indivisi, recurvo-patentes, intus fimbriati ; ovula in quoque loculo solitaria. *Discus hypogynus* distinctus, e squamis 6–8 crassis latis contiguis margine hirsutis compositus. *Capsula* 3-dyma, 6–7 mm. lata, in coccos 2-valves dissiliens, parce pubescens. *Semina* ovoidea, arillo pulposo involuta ; testa dura, crassa, nigra, nitidula, foveolata.—*Alchornea caloneura*, Pax in Engl. Bot. Jahrb. xliii. 81.

Tropical Africa. Upper Guinea : Gold Coast ; Ancobra River, *Johnson*, 919. Southern Nigeria ; Lagos, *Lamborn*, 123. Cameroons : Bipindi, Mimfiaberg, *Zenker*, 2113, 2643, 3322. Lower Guinea : Spanish Guinea ; Fang, *Tessmann*, 97 ; Bebao, *Tessmann*, 702.

1290. **Sclerodactylon**, *Stapf*, gen. nov. [Gramineae-Festuceae] ; affinis *Eragrosti*, sed spiculae densissime in spicis rigidis secundis digitatis rhachi triquetra apice nuda munitis imbricatae.

Spiculae ovatae vel ellipticae vel lineares, a latere admodum compressae, arcte imbricatae, alternae, sessiles vel subsessiles in rhachi spicae secundae ; rhachilla tarde disarticulata. *Anthoecia* numerosa, hermaphrodita, arcte imbricata. *Glumae* inaequales, durae, 1-nerves, carinatae. *Valvae* ovate, acutae, integrae, muticae vel mucronulatae, durae, 3-nerves interdum utrinque nervo tenui addito, carinatae. *Paleae* valvas subaequantes, alato-carinatae. *Lodiculae* 2, obliquel ate cuneatae, nervosae. *Stamina* 3. *Ovarium* oblongum, glabrum ; styli inferne incrassati, ima basi in stylopodium crassiusculum persistentem connati, caeterum gracillimi ; stigmata angusta, plumosa, sub anthoecii apicem lateraliter exserta. *Caryopsis* in anthoecio maturo paulo mutato inclusa, subtriquetro-ellipsoidea, stylopodio coronata, pericarpio tenuissimo (toto ?) separabili, testa tenui brunnea. Embryo circiter $\frac{1}{3}$ seminis aequans, scutello elliptico basi ultra radiculam producto, epiblasto lato, truncato.—*Perenne*, densissime caespitosum. *Folia* rigida laminis cylindricis nisi ima basi canaliculatis. *Spicae* densissimae, 2–3 ad apices culmorum digitatae, rhachi triquetra apice nuda.

Species unica Madagascariensis.

S. juncifolium, *Stapf*. *Gramen* fere totum glaberrimum. *Rhizoma* breve, radices crassas spongiosas edens. *Culmi* arctissime approximati, simplices vel parcissime ramosi, inferne compressi, superne teretes, duri, 25–50 cm. longi (spicis demptis), 2–3-nodi. *Folia* pleraque basalia ; vaginae firmae, 6–8 cm. longae, basales culmum arcte amplectentes, a latere magis minusve compressae, dorso rotundatae, laevissimae, arcte nervoso-striatae, caulinae similes, nisi subteretes ; ligulae breves, rotundato-truncatae, pubescentes ; laminae longe subulatae, cylindricae vel magis minusve compressae (sectione transversa elliptica), ima basi canaliculatae, apice pungentes, 20–40 cm. longae, ad 2·5 mm. diametro, praeter margines partis canaliculatae asperulas laevissimae, glaberrimae. *Spicae* subsessiles 5–10 cm. longae, rigidissimae, rhachi dorso carinata ; pedunculi

rudimentarii griseo-pubescentes. *Spiculae* ambitu valde variae, lanceolatae vel oblongae vel ellipticae vel ovato-ellipticae, 7–15 mm. longae, 3–4·5 mm. latae, a latere valde compressae, 7–20-florae, stramineae, glaberrimae ; pedicelli brevissimi, scaberuli ; rhachilla glaberrima. *Glumae* scariosae, a latere visae oblique lanceolatae, acutae vel subacutae, inferior 2–3 mm., superior 3–4 mm. longa, carina magis minusve asperula. *Valvae* oblique ovatae, 4·5–5 mm. longae, praeter margines anguste hyalinas durae, carina minute asperula plerumque sub ipso apice in mucronulum excurrente, nervis lateralibus inferne saepe obsoletis superne prominulis et fere ad apicem continuatis interdum utrinque altero tenuissimo interiore addito. *Paleae* alae latae, superne asperulae. *Lodiculae* fere 0·75 mm. longae. *Antherae* oblongo-lineares 2 mm. (vel ultra ?) longae. Ovarium cum stylopodio 1·25 mm. longum ; styli tenuissime capillares, 1·25 mm. longi ; stigmata fere 2 mm. longa. *Caryopsis* stylopodio dempto 2 mm. longa, brunnea. *Embryo* 0·75 mm. longus.

Madagascar. East Coast, without precise locality, *Boivin*, 2291 ; Ambongo, *Pervillé*, 545 ; Lac Manampetsa, *Perrier de la Bâthie*.

This stands out from *Eragrostis* mainly by its peculiar inflorescence which is very like that of an *Eleusine* or *Dactyloctenium* and probably also by the presence of a marked and persistent stylopodium ; but as the numerous species of *Eragrostis* have not yet been carefully examined in that direction, the latter character may in the future turn out to be less reliable. Bojer's *Eleusine juncea* (name only Hort. Maur. 370) from the mouth of the river Omlahi, somewhat to the north of Lake Manampetsa, is very likely the grass described. It grows there according to him in arid places.

XLII.—MISCELLANEOUS NOTES.

Mr. J. J. Nock, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Curator of the Hakgala Gardens, Ceylon.

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* Dr. Harry Bolus.—In the report of a Parliamentary Commission appointed in 1877 to enquire into the condition of the Botanic Garden at Cape Town, the evidence of Dr. Bolus fills several pages. The first question addressed to him—"You are a Botanist?"—elicited a reply which all who knew him will regard as characteristic. He said "I do not call myself a botanist, but I have studied botany in my leisure hours." These words genuinely express the opinion he entertained of himself and his botanical work, not only in 1877 but to the day of his death. He was one of the most unassuming of men and the last to realise that from

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* This appreciation of Dr. Bolus has been sent to the Director by Prof. H. H. W. Pearson, South African College, Cape Town, in kind compliance with a request made to him.

the quiet seclusion of his study at Sherwood there emanated an influence which was not confined to the country of his adoption, and was felt by everyone within it who was but slightly interested in the subject to which his best energies were devoted. The idea that for many years past he had been a dominant figure in the botanical world of South Africa was foreign to his mind.

So soon after his death, while we are still not fully conscious of the extent of our loss, we can hardly estimate the relative value and importance of the many aspects of his intellectual activity. In his botanical work we were impressed by his enthusiasm, his industry, his business-like precision of method and accuracy in detail. Like most busy men he was somewhat intolerant of those whose objects in life were less definite or less seriously pursued than his own. But his sympathy and time were always at the disposal of any who could meet him on the common ground of interest in botany or in any other subject of which he had made a study. While his own botanical work was mainly systematic and geographical, and it pleased him to affect to regard other branches of plant investigation with kindly forbearance, he really possessed a deep and lively interest in all parts of the subject. He loved plants and nothing that concerned them failed to appeal to him. He was a man of broad views and wide interests, as is sufficiently betokened by the material objects which he gathered round him and which shared in his solicitude—his fine herbarium, his collection of botanical books, his extensive general library, his old furniture, his collection of pictures.

However sedulously a man of this type shuns the public eye he cannot fail to exercise a far-reaching influence even beyond his immediate circle of kindred spirits. Dr. Bolus' efforts were more particularly directed towards the advancement of the subject whose welfare he had most at heart. The effect which his life and work have produced and will produce in South Africa is not to be ascribed entirely, perhaps not even mainly, to the publications which made his reputation in Europe nor to the unrivalled knowledge which he had so laboriously acquired of the vegetation of South Africa. It rather had its source in the relations which existed for many years between him and numerous botanical correspondents scattered through the country. He was ever ready to give of his best to help anyone to begin or to continue the study of botany. He stimulated many residents in remote districts to interest themselves in the vegetation which surrounded them—with great benefit to themselves and to the increase of knowledge of the flora. One of his most esteemed correspondents, Miss Pegler, whose name is well-known as a successful collector, writes "as you say there is no one to fill his place. So far as I personally am concerned, I could never have done the little collecting which I have done had it not been for his helpful criticism and kind encouragement." These words express a feeling which will be entertained by many who looked to him for advice and assistance in the labours which he had encouraged them to undertake. In a letter addressed to the writer of these lines a few weeks before he died, Dr. Bolus incidentally refers to this part of his life-work when he says: "Over the whole of South Africa from the Cape

Peninsula to the Transvaal and even to Basutoland there have been isolated workers engaged in collecting and investigating the flora of the country, stimulated and assisted, so far as may be, by students in the more populous centres of the southern coast. A great deal has been done in this way, without show, but not without cost, both of time and money, in laying the foundations for further advance." The foundations have been well laid and of the many who have been concerned in laying them, Dr. Bolus was among the chief.

Reviewing the second edition of the "Genera of South African Plants" in 1869, Dr. Bolus draws attention to the fact that this work provided a basis for further investigation, and urges the necessity for a more detailed study of geographical distribution. He points out that the traveller cannot supply the place of the resident observer, and lays stress on the very small area of South Africa which at that time had been at all thoroughly explored. The whole of the Western Province (including the most interesting part of the flora of South Africa) was then known only through the work of the earlier travellers. He seeks to direct the attention of residents to this need for detailed work, and adds in a note that he will be happy to correspond with anyone with a taste for Natural History who may be willing to assist. This appears to be the first published indication of the policy which he pursued with such marked success for the rest of his life. A few years later he became himself a resident in the Western Province, and from that time the study of its flora has actively progressed. His efforts were ably seconded by the late Dr. MacOwan and other observers, with the result that to-day the flora of the Cape Peninsula is probably more thoroughly known than that of any other part of South Africa. He sought further to advance the study of botany in Cape Town by a large financial contribution towards the establishment of a Chair of Botany, called by his name, in the South African College. In the foundation and subsequent growth of what was practically a new department, he took a deep interest, and lost no opportunity of assisting those who were responsible for the conduct of its affairs. He served for some years as a member of the College Council. And now he has entrusted the College with the maintenance and extension of the herbarium and botanical library which embody the results of so large a portion of the activities of a long and strenuous life.

His desire to assist the student who, for lack of opportunity, want of means, or for some other cause, was unable to follow his bent, was not circumscribed by the limits of his own subject. Many students have had cause to realise this, and now it is made public by the directions attached to his munificent bequest to the South African College for the establishment of what will be known as the Bolus Scholarships. In selecting the scholars the authorities are enjoined "to search out those who are really in need of pecuniary assistance to help them carry on their studies; rather to insist on evidence of good moral character, industry and a desire to learn than to be influenced by the evidence of superior mental ability." The same spirit is seen in his careful provision that copies of his own published works are to be supplied at reduced prices to students.

By common consent Dr. Bolus occupied a unique and honoured place among botanical workers in South Africa. His death removes one of the most striking figures from the ranks of her scientific men, and leaves a vacancy which no one man can fill. In the annals of South African Botany his name and his record will be written in large characters. As he himself delighted to recall the doings and discoveries of Thunberg, Burchell, Drège and others of his distinguished predecessors, so future generations of botanists and other seekers after knowledge will revere his memory as of one who during his life conspicuously advanced the study of his science, and in his death ensured the continuance of his life-work and the extension of the benefits of education.

Elliottia racemosa, *Muehl.*—A note on this interesting and extremely rare shrub appeared in the *Bulletin*, 1906, p. 226. At that time we were unable to say anything as to its beauty from direct evidence, as the two plants at Kew (which we believe to be the only ones in Europe) had neither of them flowered. The larger plant of the two, now about seven feet high, has this summer borne a crop of 21 racemes, the first flowers opening on July 24. It proves to be a shrub of great beauty as well as interest and rarity. The racemes are terminal, quite erect, 6 to 9 inches high, 2 to $2\frac{1}{2}$ inches in diameter, the flowers mostly solitary, occasionally in pairs or in threes on the peduncle, which is white and $\frac{5}{8}$ to $\frac{3}{4}$ inch long. Flowers pure white, fragrant, $\frac{3}{4}$ to 1 inch across; corolla lobes 4, narrowly oblong, obtuse, ultimately much reflexed, free to the base; calyx minute, saucer-shaped; stamens 8, less than half as long as the corolla lobes; style as long as the corolla lobes, in the hooded apex of the lowest one of which the stigma is at first enclosed. The flower-bud is at first erect on the peduncle; as the flowering time approaches it becomes inverted and nodding; but just before the expansion of the petals it rises again and stands out horizontally; and in that position the flower remains. A raceme six inches long bears about 40 flowers.

Elliottia is a monotypic genus and belongs to the *Ericaceae*. Flowering as it does towards the end of July, it would make a delightful addition to flowering shrubs could it ever become common in gardens. But it is almost or quite extinct in its native localities in Georgia, and no successful method of propagating it has yet been devised. Cuttings of the branchlets have several times been tried at Kew without success. The only plants raised have been two from root cuttings, neither of which ever looked like living, although they formed a few roots; both ultimately died. The fruit of *Elliottia* is not known, and it is unfortunate that although artificial fertilisation has been resorted to no fruit has been obtained. Bees have also visited the flowers in great numbers.

W. J. B.

Maerua Gilgii.—With reference to the note on *Maerua angustifolia* (*K.B.* 1911, p. 245), Dr. Hans Schinz writes to point out that in July, 1903, he proposed the new name *Maerua Gilgii* for *Boscia angustifolia*, Harv. (Bull. Herb. Boiss., sér 2, vol. iii., p. 668). This

name, which had been overlooked, should accordingly be adopted for the species in question. Some confusion seems likely to arise, however, with *Maerua Gilgiana*, De Wild., which was published in January, 1903 (Ann. Mus. Congo, sér. 4, p. 180).

T. A. S.

Botanical Magazine for July.—The plants figured are *Viburnum rhytidophyllum*, Hemsl. (t. 8382); *Spiraea Veitchii*, Hemsl. (t. 8383); *Dracocephalum argunense*, Fisch. (t. 8384); *Cucumis metuliferus*, E. Meyer (t. 8385); and *Cypripedium speciosum*, Rolfe (t. 8386).

The *Viburnum* is a very distinct species belonging to the group which includes *V. Lantana*, Linn., and is well characterised by its long oblong-lanceolate coarsely rugose leaves, which are densely clothed on the underside with a white or brown stellate indumentum. The dull yellowish-white flowers are succeeded by an abundance of fruit, which is at first red and finally black. The species has been introduced from Western China by Messrs. James Veitch & Sons, and proves quite hardy at Kew, where the plant from which the material for the figure was obtained is growing.

Spiraea Veitchii is an ally of *S. canescens*, D. Don, and *S. Henryi*, Hemsl., differing from both in having entire leaves glabrous above. It is a native of Central China, and as in the case of the *Viburnum*, seeds were collected by Mr. E. H. Wilson for Messrs. Veitch, in whose nursery at Coombe Wood the plant which furnished the specimen figured was grown.

Dracocephalum argunense is an attractive Labiate for a sunny situation, its large violet-blue white-spotted flowers being freely produced in rather dense terminal racemes. It is very similar to *D. Ruyschiana*, Linn., and is often regarded as a variety of that species, differing chiefly in having much larger flowers. *D. argunense* was first introduced into European gardens in 1822. It is a native of Dahuria, Mandshuria, the Amur region, North China, and Japan, the specimen figured having been grown at Coombe Wood from seed received by Messrs. Veitch from Weichang, in North China.

Cucumis metuliferus, the Horned Cucumber, is widely distributed in Tropical Africa, and has been met with on one occasion as far south as Pondoland, where the species was originally discovered by Drège. The Kew plants were raised from seeds presented by Mr. C. H. Stanton, of Field Place, Stroud, these having been collected at Khartum by Major A. E. Stanton. The fruits of this cucumber are $2\frac{1}{2}$–5 inches long, and are furnished with thick conical spines $\frac{1}{4}$–$\frac{1}{2}$ inch long. When ripe they are a rich scarlet.

The *Cypripedium* is a handsome Japanese species, a plant of which was sent to Kew for identification by Messrs. Bees, Limited, with whom it flowered in June, 1910. It is closely allied to *C. macranthum*, Swartz, and has been cultivated for some years under the name of that species. It differs in having whitish or pale flesh-coloured flowers veined with rose, and a more acute staminode.

Botanical Magazine for August.—The plants figured are *Clusia grandiflora*, Splitg. (t. 8387); *Torenia atropurpurea*, Ridl. (t. 8388); *Landolphia Petersiana*, Dyer (t. 8389); *Mormodes revolutum*, Rolfe (t. 8390), and *Mutisia Clematis*, Linn. f. (t. 8391).

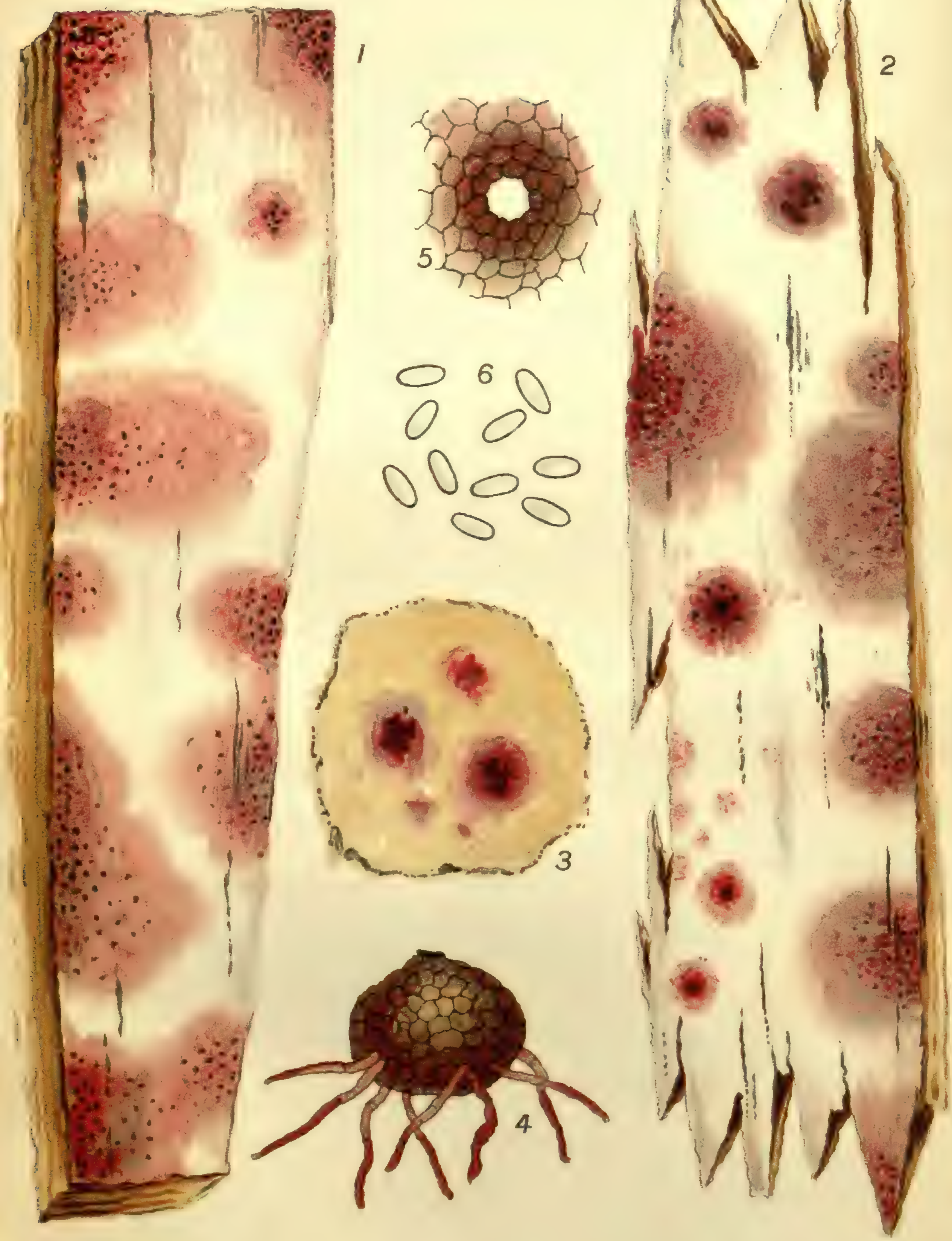
Clusia grandiflora is a native of Guiana, and is figured from material supplied by Mr. R. Irwin Lynch, of the Cambridge Botanic Garden, where the plant has flowered annually for some years past. The flowers are very handsome, the eight petals, which are white with rose-coloured markings towards the base, are $2\frac{1}{2}$ inches long and 2 inches wide. The species, like many of its congeners, is epiphytic, and in a state of nature in many instances ultimately destroys the plant which supports it by strangling it.

The *Torenia* is a very distinct species, remarkable in the shape and colour of its flowers. These are dark purple, and have a long narrow tube. As is commonly the case in *Torenia*, the flowers are very fugitive, but as they are produced freely the species is an ornamental subject for a warm moist house. *T. atropurpurea* is a native of the island of Sumatra and of the central portion of the Malay Peninsula. The Kew plant from which the illustration was prepared was presented by the late Colonel Beddome, who had received the species from Sir Frank Crisp.

Landolphia Petersiana has pure white sweetly scented flowers. A rubber of inferior quality is obtained from its latex. The species is widely distributed in East Africa, and was first introduced into the Kew collections from Zanzibar in 1879, when seeds were received from Dr. (now Sir John) Kirk. The figure was prepared from a plant received from the Jardin des Plantes, Paris, in 1892.

The *Mormodes* is a recent introduction from Peru, whence it was obtained by Messrs. Sander & Sons through their collector, Mr. Forget. It flowered for the first time in cultivation in 1909 at St. Albans. A plant has been purchased for the Kew collection, and from this the material for the figure was procured. The species has showy, cinnabar-red flowers with a yellow lip, and is allied to *M. speciosum*, Linden.

Mutisia Clematis is a handsome climbing Composite from the Andes of Peru and Colombia, having pinnate leaves and large flower-heads, which are conspicuous with their bright red florets. The plant has been grown at Kew for many years, and a fine specimen is at present trained against a pillar in the Himalayan section of the Temperate House.



A Paint-Destroying Fungus.

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To face page 325.]

Malby & Sons, Lith.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 8.] [1911.

XLIII.—A NEW PAINT-DESTROYING FUNGUS.

(*Phoma pigmentivora*, Mass.)

(With Plate.)

G. Massee.

It is proverbial that certain kinds of fungi flourish on the most varied substances, acid and alkaline solutions respectively in some instances forming a suitable matrix. Writing-ink frequently becomes clogged with the mycelium of the common blue mould *Penicillium glaucum*; the same fungus also invades eggs, the mycelium penetrating to the interior through the porous texture of the shell. In the laboratory water solutions of stains, more especially eosin, are frequently rendered useless owing to a dense growth of mycelium; dilute solutions of acetic acid and of glycerine are also invaded. As a rule, when fungi develop under such exceptional conditions they remain sterile, the mycelium or vegetative portion of the fungus alone developing, and often presenting many remarkable departures from the normal type of structure.

Amongst the most remarkable of such fungi is one that elects to grow on fresh paint. It flourishes in the greatest profusion in hothouses, its development being apparently favoured by a high temperature and constant humidity, as it is but rarely observed on paint elsewhere. About a month or two after a hothouse has been painted, more especially if white paint has been used, numerous small pale rose-coloured specks appear on the paint; these specks gradually increase in size, and change to a purple, or sometimes dark red colour, suggesting the idea of blood having been sprinkled over the paint. In course of time the discoloured areas extend considerably, and form broadly effused patches several inches across. About a week after the coloured patches are fully developed, their surface becomes studded with minute blackish-red warts. Each wart is a fungus fruit, containing myriads of very minute spores, which in due course are dispersed and start new points of infection.

When the fungus appears in abundance, as is usually the case, the paint is irretrievably ruined, and serious loss follows. During

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the present year one firm of painters lost over £200 in consequence of the appearance of the fungus in a large number of cucumber-houses painted with expensive protective paint. All the work had to be done over again, and in some instances the second coat had to be removed and a third coat applied.

The surface of the paint is not at all broken up, or in any way injured by the fungus, and the amount of discoloration depends on the relative quantity and spread of the mycelium.

When the spores of the fungus are sown on a streak of wet white paint, a faint roseate tint appears in about a week's time, and within three weeks fruit is produced in abundance, and the deep purple characteristic blotches are well developed.

Spores sown on a thin smear of pure linseed oil germinate as readily as in paint, but the mycelium remains colourless, and, so far, no fruit has been produced. The result is the same when the spores germinate in ordinary nutritive media or in water.

No germination takes place when the spores are sown on a streak of pure white lead, or carbonate of lead. Hence this substance alone is not a suitable medium for the growth of the fungus, although its presence is necessary to enable the plant to complete its normal course of development, and it is also the constituent from which the fungus produces as a by-product the purple-red colouring matter, which is collected in oily-looking drops within the cells of the mycelium, the cell-walls themselves remaining colourless. The red colour suggests that the white carbonate of lead undergoes some chemical change induced by the presence of the fungus, resulting in the formation of red oxide of lead. This matter, however, requires careful investigation.

The presence of two per cent. of carbolic acid in paint completely arrests the development of the fungus.

Hydrogen peroxide bleaches, or at all events considerably reduces the red colour without injuring the paint, but this is not a practicable remedy on an extensive scale.

The following is a technical description of the fungus :—

Phoma pigmentivora, *Massee*. *Maculae* suborbiculares, determinatae, laete rosaceae vel rosaceo-purpureae, 1–8 cm. diametro. *Perithecia* in maculis laxe gregaria vel confertiuscula, vix prominula, purpureoatra, subglobosa, contextu parenchymatico, ostiolo vix papillato donata, 125–150μ diametro. *Sporulae* ellipsoideae, hyalinae, 4–6 × 2–2·5μ.

Explanation of Plate.

Figs. 1 and 2 showing discoloured patches produced by the fungus. Nat. size.

Fig. 3. Patches of the fungus three weeks after the spores were sown on a thin film of wet paint. Nat. size.

Fig. 4. Perithecium of fungus. Highly magnified.

Fig. 5. Mouth or opening of a perithecium. Highly magnified.

Fig. 6. Spores of fungus. Highly magnified.

XLIV.—GARDEN NOTES ON NEW TREES AND SHRUBS.

(With Plate.)

W. J. Bean.

VIII.—*New Chinese Species.*

Berberis verruculosa, *Hemsley and Wilson* [Berberidaceae].

Among the numerous species and forms of *Berberis* which recent exploration in China has added to our collections, none is more distinct and in habit at least more pleasing than this. It is an evergreen bush of low, sturdy, very neat habit, probably never much more than two feet high. One of the most distinctive characters of the plant is the roughness of the young stems due to a dense covering of small, dark, warty excrescences. Leaves densely arranged in fascicles along the branch, elliptic-oblong, ½ to 1½ inches long; spine-tipped and spiny-toothed, coriaceous, dark shining green above, glaucous beneath, margins revolute. Flowers golden-yellow, short-stalked, solitary or in few-flowered fascicles. Fruit black covered with a blue bloom. The species was discovered in Western China and introduced by Wilson in 1904. Four years later it flowered with Messrs Veitch at Coombe Wood, and to them Kew is indebted for a healthy plant lately added to the collection.

Carpinus polyneura, *Franchet* [Betulaceae].

This beautiful hornbeam is only represented in cultivation by a single tree at Kew, growing at the north entrance of the Rhododendron Dell and now about 16 feet high. It was raised from seed sent by Mr. A. Henry, in 1889, from Central China. It is a small tree 30 feet high with slender branches pendulous at the ends which give the tree a very elegant aspect. Leaves ovate, acute, slightly cordate at the base, 1 to 2½ inches long, ½ to 1 inch wide, sharply (occasionally doubly) dentate, dark shining green and glabrescent above and with silky down on the midrib and veins beneath. The leaves differ from those of other hornbeams in cultivation in being flat and scarcely plicate. In its leafless state the tree is distinguished by the narrow, linear, silky stipules which persist through the winter and until the appearance of the new leaves. The tree at Kew flowers regularly and has borne clusters of fruit but the seed formed has hitherto been infertile.

Corylus Colurna var. **chinensis,** *Burkill in Journ. Linn. Soc.* xxvi., 503 [Cupuliferae].

Few deciduous trees are more handsome in leaf and habit or more interesting in fruit than the "Constantinople Nut"—*Corylus Colurna.* It reaches 70 to 80 feet high in continental gardens and is the only species of *Corylus* hitherto in cultivation which makes a genuine tree. A new arborescent variety, however, has recently been introduced from Central China, viz., the var. *chinensis* of Burkill. Originally discovered by Henry, in Szechuan in 1888, nuts were first sent home by Wilson in 1901 from which a number of young trees were raised by Messrs. Veitch at Coombe Wood, and thence obtained for Kew. Mr. Wilson informs me that this tree is usually met with 50 to 60 feet high, but that he has seen it over

100 feet high—a magnificent size for one of the hazels. The leaves are ovate-oblong or obovate, as much as 6½ inches long by 4 inches wide, deeply and obliquely cordate at the base, acuminate, rather finely and unequally dentate; pilose on the midrib and with scattered bristles above; glandular-pubescent on the midrib and veins beneath. The young branchlets and petioles are also glandular-pubescent. Our young plants have not borne flowers as yet, but they give promise of being quick growers and perfectly hardy.

Fokienia Hodginsii, *Henry and Thomas* [Coniferae].

Mr. H. Clinton Baker of Bayfordbury has recently presented to Kew a plant of this new and extremely rare conifer. It is one of a few living specimens sent to him in 1909 by his brother Capt. L. Clinton Baker, R.N., from the Fokien province of Eastern China. The species has been made the type of a new genus of *Coniferae* by Henry and Thomas. It is described by the authors as in many respects intermediate between *Cupressus* and *Libocedrus*, the cones being similar to those of the cypresses belonging to the Chamaecyparis group, the foliage resembling in many points that of *Libocedrus macrolepis*. It is described as a tree 40 feet high. On Mr. Clinton Baker's plant—a young one about four feet high—the flattened, sharply pointed leaves are ¼ to ⅓ inch long, deep lustrous green above with conspicuous white bands of stomata beneath. The leaves are in flattened whorls of four, the outer pair twice as large as the inner are. Mr. Clinton Baker thinks that it will not withstand our winters but in any case it will make a handsome evergreen for conservatories and winter gardens and may prove suitable for the south-western counties in the open.

Pinus Bungeana, *Zucc.* [Coniferae].

The lace-bark pine of China is one of the most remarkable and attractive of its kind. It is still amongst the rarest of pines in gardens, but is represented at Kew by a number of well-grown examples. These have produced cones in recent years and the species has been figured in the *Botanical Magazine* t. 8240. No cultivated specimen appears yet to have developed the white bark which is the most remarkable characteristic of this pine and which is well illustrated in the accompanying plate of trees growing in the environs of Peking. The Kew trees shed their bark freely after the fashion of a plane, but the newer bark revealed is dark brown and not white. The accompanying extract from an interesting letter of Sir Ernest Satow's would seem to show that this is probably due to the comparative juvenility of our trees:—

"Here is a photograph of three specimens of *Pinus Bungeana* standing about three miles west of Peking. The structure on the left of the centre tree is an old tomb, and the height of the masonry as far as my recollection goes is about 8 feet, which affords a standard for measuring the height of the trunk up to the point where the branches begin. The tomb is quite old, and neglected, so that possibly it is more than a century old. There are a great many of these trees in and near Peking, either in the grounds of palaces or planted in private graveyards of wealthy families. I

To face p. 329.]

never saw one that seemed self-sown. I find a note made in 1904 that sometimes the trunk divides a few feet from the ground, and the stems grow up straight side by side. In other cases it reaches a height of at least 20 feet without dividing, and then branches out forming almost a spherical head. The younger trees have a greenish reddish bark, which in older specimens looks quite white when seen from a distance. The peasants scratch the bark with a knife in order to procure the resin.

"When I planted one in the grounds of the Legation I was told by the Chinese florist from whom I bought it that these trees do not exhibit a white bark till they are about fifty years old."

Explanation of Plate.

The upper photograph represents the three trees of *Pinus Bungeana* growing near Peking described in Sir Ernest Satow's letter.

In the lower photograph three other white-barked trees of this species are shown and on the left is seen the trunk of another species of *Pinus*. The specimens of *Pinus Bungeana* differ from those in the upper figure in their less compact habit. The trunks in two of the specimens have forked near the ground. This photograph was also taken near Peking.

Sarcococca humilis, *Stapf* [Euphorbiaceae-Buxeae].

Species nova a *S. Hookeriana*, Baill., differt statura humili, foliis minoribus et pro ratione latioribus, costa inter sulcas supra magis prominente, bracteis obtusis minute apiculatis latius hyalino-marginatis, filamentis brevius e periantho exsertis.

Fxutex humilis, ramulis novellis tenuiter pubescentibus diu viridibus. *Folia* lanceolata vel nonnulla subovato-lanceolata, utrinque acuta, 3–7 cm. longa, 1–1·8 cm. lata, laete viridia, subcoriacea, praeter costam supra inter sulcas distincte prominentem basin versus papilloso-pruinosam glaberrima, in petiolum 4–6 mm. longum sensim decurrentia. *Florum* glomeruli circiter 6-(rarius pluriflori), ante anthesin saepe nutantes; bracteae ovatae, acutae. *Perianthii* ♂ sepala 4, late ovata vel interiora late elliptica, obtusa, saepe minute apiculata, minutissime ciliolata, 3·5–4 mm. longa. *Stamina* 4, filamentis 6 mm. longis, antheris primo purpureis denique flavis minute apiculatis, 0·5 mm. longis. *Perianthii* ♀ sepala 4 vel 6, ovata, acuta, angustiora quam in ♂, minutissime ciliata, 2 mm. longa; stigmata 2 vel 3. *Fructus* baccatus, globosus, niger, 7–8 mm. diametro.

China. Hupeh: Changyang, *Henry*, 7834; Szechuan, *Henry*, 7065. Western China, without precise locality, *Wilson* (cult. by J. Veitch & Sons from seeds, collected by Wilson, 1907).

An evergreen shrub 1 to 1½ feet high, of neat tufted habit, sending up new stems from the ground like the butcher's broom, the young stems covered with a minute pubescence. Leaves alternate or sub-opposite, lanceolate or ovate-lanceolate, pointed at both ends, 1 to 3 inches long, ⅓ to ¾ inch wide, glabrous, leathery, dark lustrous green, with a prominent marginal nerve; petiole ⅛ to ¼ inch

long. Flowers white, very fragrant, produced during early spring in short racemes from the axils of the terminal leaves. Fruit a roundish black berry, ¼ inch in diameter.

Although this little evergreen is not in any way showy, its dainty habit and fragrant flowers will make it suitable for a shady corner of the Rock Garden. It is a native of Western China and was introduced by Wilson in 1907 for Messrs. Veitch, from whom the plant at Kew has been obtained.

IX. *Two Japanese Trees.*

Fagus japonica, *Maximowicz* [Cupuliferae].

Very little is known of this beech in Britain. Professor Sargent sent a plant to Kew in 1907 and this, so far as I am aware, represents its first appearance in this country. Last year the Japanese authorities of the Shepherd's Bush Exhibition brought over a few specimens from Japan, one of which they presented to Kew. It is a small deciduous tree, often a mere bush, the young branchlets covered with silky hairs. Leaves oval or ovate, sometimes cuneate at both ends and rhomboidal; 2 to 2½ inches long, 1 to 1½ inches wide; silky when young like the branchlets, but glabrous by autumn. The most distinctive character of the species is the comparative shortness of the involucre of the nut. The nut is triangular as in the common beech and ½ inch long but it is little more than half enclosed by the involucre. Involucre 4-lobed, covered with short stiff spines. How little is known of this beech may be inferred from the fact that there is only one specimen in the Kew Herbarium, which was collected in the Hakone mountains of Japan by Tschonoski.

Magnolia salicifolia, *Maximowicz* [Magnoliaceae].

In a genus of such distinction and garden value as *Magnolia*, the addition of a new species to those already in cultivation is a matter of considerable interest to planters. *M. salicifolia*, which flowered at Kew in April last for the first time, is a native of Japan, and was introduced in 1904. According to Professor Sargent (Forest Flora of Japan, p. 10), it is very common on Mt. Hakkoda and is there a slender tree 15 to 20 feet high with a trunk about 1 foot in girth. In our cultivated specimens the leaves are oval to lanceolate, 2 to 4 inches long, ⅝ to 1¼ inches wide, dark green and glabrous above, glaucous and covered beneath with a fine pubescence. The flower has six pure white petals, the inner three 2 inches long, ½ inch wide, oblong, acute; the outer three are scarcely so long, slightly obovate, ⅝ inch wide. Peduncle, winter leaf-buds and branchlets perfectly glabrous. Seeds, according to Shirasawa, scarlet. It is curious that a tree so plentiful in its own habitat should be so little known. Professor Sargent remarked in 1894 (*loc. cit.*) that the flowers were unknown to botanists, and there are none in the Kew Herbarium. A flowering twig has, however, since been figured by Shirasawa, Iconog. Essences Forest. Japon, vol. i, t. 40. The species is evidently closely allied to *M. Kobus*, but besides differences in foliage, the leaf buds of *M. Kobus* are pubescent and the peduncle silky.

X. *A Himalayan Cherry.*

Prunus rufa, *Wallich* [Rosaceae].

This interesting cherry was raised from seed sent to Kew from the Calcutta Botanic Garden in 1897 and has so far proved perfectly hardy. During the last few years it has flowered freely. It is a deciduous tree said to be 15 to 20 feet high, the young branchlets covered with a dense, rusty-coloured pubescence. Leaves 2 to 4 inches long, narrowly elliptical or oblong-lanceolate with an acuminate apex, conspicuously glandular-dentate, the upper surface glabrous, the lower one hairy when young only on the midrib and nerves. Flowers pink, ½ inch diameter, produced during May singly or in pairs from axillary buds of the previous year's growth. Calyx funnel-shaped, ⅓ inch long with five triangular dentate lobes. There are two forms of this cherry at present in cultivation at Kew, the one with a glabrous calyx and close bark, the other with a hirsute calyx and conspicuously peeling bark. Whether these characters are always correlated or not, I have not had an opportunity of ascertaining.

This cherry is a native of Nepal and Sikkim at elevations of 12,000 feet and although not one of the most showy is pretty and distinct on account of the rufous down, and the conspicuously glandular teeth of the leaves.

XI. *A Monotypic American Tree.*

Leitneria floridana, *Chapman* [Leitneriaceae].

While this shrub or small tree is not likely to add much to the ornamentation of gardens it is undoubtedly one of the most interesting plants of North America. In itself it constitutes the Natural Order *Leitneriaceae*, which Bentham and Hooker place between *Platanaceae* and *Juglandaceae.* An undated specimen in the Kew Herbarium was collected, according to a note in Sir Wm. Hooker's handwriting, by Drummond on the "Rio Brazos, Texas." This represents the earliest discovery of the species (probably in 1835), but there is much doubt of its having been collected in the place named; it has at any rate never since been found there. It was found again in 1847 by Dr. Chapman near the town of Apalachicola in Florida. Finally in 1892, it was found in a new station by Mr. B. F. Bush in S.E. Missouri. Wherever it has been seen wild it inhabits swampy spots, often with its roots submerged.

The *Leitneria* is a shrub or small tree usually 5 to 10 sometimes 20 feet high, with a main stem 3 to 5 inches thick at the base, the young branchlets hairy. The leaves are narrowly oval, tapered about equally at both ends, 3 to 7 inches long, 1½ to 3 inches wide, thinly hairy above, clothed with brown felt beneath. The plants are unisexual, the male flowers borne on the naked wood, in stout, axillary, erect catkins 1½ inches long and consisting of stamens only enclosed in a hirsute scale. The female flowers are in shorter, more slender catkins. Fruit a dry drupe, compressed, oval, ¾ inch long, ¼ inch wide. The wood is, perhaps, the lightest known, having little more than one-fifth the specific gravity of

water. The species has recently been obtained for Kew from the New York and Missouri Botanic Gardens and from the Arnold Arboretum.

The behaviour of the *Leitneria* in cultivation can as yet be only surmised, but last year I saw it thriving in the Arnold Arboretum and in Highlands Park, Rochester, N.Y. In the former place it was planted in peaty soil, and occupied a low moist position, but at Rochester it was in an ordinary position on a sunny slope planted in a bed of Azaleas and other peat lovers. It was also thriving well in ordinary soil in the New York Botanic Garden. All these places have much colder winters than ours but the summer heat is greater. According to Professor Trelease who gives a full and interesting account of this remarkable tree in the *Sixth Report of the Missouri Botanical Garden*, it grows in rich swampy soil which never becomes dry and where there is usually 6 inches or more of water. But experience shows that it is inadvisable to attempt to imitate nature too closely in such respects. Many water-loving trees of North America thrive quite well here in ordinary soil. This shrub will be most likely, I think, to succeed in the sunniest position we can give it, planted in a peaty soil never allowed to become dry.

XLV.—REPORT ON INVESTIGATIONS MADE REGARDING "BEECH COCCUS."

(*Cryptococcus fagi*, Bärensprung).

L. A. Boodle and W. Dallimore.

Introduction.

During the last fifteen years some concern has been felt by owners of estates in various parts of the country on account of the increase of the insect pest, known familiarly as "Beech Coccus" or "Beech Louse," and scientifically as *Cryptococcus fagi*. In many quarters the insect is credited with causing the death of those trees which it attacks, and opinions have been expressed that it will eventually increase so as to cause an epidemic, which will devastate whole plantations. On the other hand, there are those who have taken a less pessimistic view of the disease, and are sceptical as to whether the amount of injury attributed to the insect is really caused by it.

In view of these conflicting opinions, we were instructed by the Director of the Royal Botanic Gardens, Kew, to investigate the matter in order to ascertain, if possible, the precise action of the Coccus on the Beech, and to obtain an idea of the damage it is actually doing or is likely to do. With that object before us visits were paid to numerous beech-woods in the Chiltern district, and attention has been given to the disease under various conditions in different parts of the country.

Description.

The appearance of an infested tree is well known to people who are interested in arboriculture or sylviculture, for the white, cottony covering with which the insect protects itself is very conspicuous. It is usually most abundant on the undersides of the branches and in cracks and depressions in the bark; but occasionally it may appear in large patches covering a considerable part of the trunk.

The insect itself is less familiar, for it is very small, and though visible to the naked eye, a lens or microscope is required to study it satisfactorily.

The mature insect has a rounded form and yellow colour, and a sucking-tube composed of three parts. This tube is attached to the lower side of the insect and is inserted in the bark so as to act as an anchor and feeding-tube. The body bears a number of fine threads of a waxy substance, which form a wool-like covering and completely hide the insect. In the young stage, the insect has six legs, and may be seen in an active condition in early autumn. It settles down in a short time, loses its legs, and becomes permanently attached to the bark by its sucking-tube.

References.

That the disease is not a new one is evident, for occasional references have been made to it for more than half a century. The earliest record we have found occurs in the "Gardeners' Chronicle" for January 30th, 1858, p. 71. In this reference to the disease (in an editorial reply to a correspondent), the insect is called *Psylla fagi*, and it is stated that it is understood not to injure the beech, though it infests it largely. In the issue of the same journal for Jan. 7th, 1860, p. 8, the coccus is again referred to, though under the name of *Psilonia nivea*, Fries., [Beech-bark Fungus]. It is described as being not common, but occurring in great abundance if at all.

The following article by Mr. R. G. Foggo in vol. vii of the "Edinburgh Botanical Society's Transactions" 1863, p. 334, serves to show that the Coccus-disease was prevalent at that date, that its distribution was probably similar to what it is at the present day, and that during the half-century which has elapsed, little knowledge has been gained of the actual relation between the growth of the Coccus and the health of the trees.

"For two or three years preceding 1858 my attention was directed to a disease which had proved fatal to some very fine specimens of beech in a gentleman's park in the county of Suffolk.

"The trees in question were greatly valued by the proprietor as objects of ornament, and various means were tried to effect a cure, and if possible, to arrest the further progress of the disease, but without any beneficial result. The beech is one of the most accommodating trees as regards soil and situation and it was evident that the disease did not arise from any peculiarity in the soil, which consisted of sandy loam, with subsoil of chalk and gravel. In hot dry seasons the trees suffered much from drought. I mention this fact because I have seen the same form of disease

amongst trees growing in wet, low-lying districts; and when seeking information from foresters and others interested in such matters, they have invariably attributed it to dampness of situation. The disease is caused by minute insects, and not as some have thought, by a species of fungus. The trunk of the tree is first attacked, and while some portions of it to all appearance remain in a healthy state, those which the insects infest gradually assume a dry appearance and when closely examined, the bark will be found to separate from the wood, and become dry and lifeless. Other unfavourable influences may, of course, favour the speedy decay of the tree, but it soon becomes evident that future healthy development is arrested, and when the trees are cut down, the ravages of the insects cease with the life of the bark. This is, I think, the most curious circumstance connected with the disease and may under careful investigation go some length to make us acquainted with means to effect its destruction. While the ravages of the insects seem to be confined to patches and districts of plantations, their existence is pretty widely spread throughout the country, and on trees growing under all circumstances. Attempts to effect a cure or to prevent the occurrence of the disease have, as far as I can ascertain, proved a failure. Other trees more valuable than the beech are in some places affected with a disease to all appearances similar; as for example, the silver firs on the estate of Dunmore near Stirling. Amongst the many plans adopted here, the only one that has succeeded to any degree is that of brushing, with a hard brush, the parts infected, when the bark is dry."

In the same journal at pp. 267–268, of the same year, attention is directed to a peculiar diseased condition of beeches at Tyninghame and Mellerstain, estates of the Earl of Haddington, in a letter from the Earl to Prof. Balfour, which was read at a meeting of the Society. The stems are said to be covered by a cottony matter, and the Earl wished to know whether it killed trees, or whether it only appeared on trees in failing health, for in every case affected trees died. In some instances the whole tree was covered and in others one side only. He had written to Mr. Hardy of Penmanshiel, who had replied that the insect was *Coccus fagi*, and gave an account of a former case noticed at Dalkeith, and also said that it occurred near London. In the discussion which followed, Mr. W. R. McNab remarked that Mr. McIntosh had noticed a similar diseased condition of the beech trees in Dalkeith Park, and had recorded the facts in the first volume of the North British Agriculturist. He seems to have considered it a fungus. Mr. McNab thought that the Coccus only appeared on trees which were already in an unhealthy condition. Dr. Balfour stated that the same species of Coccus had destroyed some beech trees in the Botanic Garden, Edinburgh, which had been planted very closely and were hemmed in by other trees and shrubs.

In the "Gardeners' Chronicle" for August 19th, 1865, p. 776, M. J. B. [Berkeley], replying to E. T., says about the Coccus that "it has been called a fungus, *Psilonia nivea*, but is an insect, and appears frequently on the bark of living trees, but that it was not known to cause death." He adds that "the drought of the previous year had been fatal to many trees which were in an

unhealthy condition and that a quantity of fine beech perished a few years earlier on Sir W. Middleton's estate. In that case it was found that the roots of the trees were extensively attacked by a fungus." In the same journal Mr. A. D. Webster alludes to the presence of the insect on the Penicuik estate, Midlothian, in 1875, in an article which appeared on October 10th, 1908, whilst several references are made to the disease in "Woods and Forests" for the years 1883 and 1884.

The following note respecting the disease appeared in vol. xxvi., p. 598 of the "Journal of the Royal Horticultural Society." "At the moment we can only speak positively of the South-east of England, but we should like to receive reports from other parts, for we fear that the beech is doomed all over the country, and that the next generation will only know by pictures and reports how gloriously beautiful our forest-beeches have been."

In the face of such gloomy predictions we find other people writing in a much more hopeful strain. In the "Gardeners' Chronicle" for July 23rd, 1904, p. 58, Mr. Brotherston writes as follows. "At present there is not a little consternation evinced concerning the safety of beeches on account of the prevalence of what used to be called *Coccus*, but now *Cryptococcus fagi*, on many trees. It is a question if this almost microscopic insect effects the amount of mischief that is laid to its charge, and on account of which so much fear is entertained concerning the very existence of so many specimens of this noble tree. For one thing it is no new pest, old people have known it all their lives and not only that, but have an acquaintance with trees that have sheltered and fed generation after generation without any apparent distress to themselves. I have watched a young tree for more than a quarter of a century, and it has gone on increasing in size and stature all that time, and at present is in the perfection of health, notwithstanding the innumerable colonies of the Beech-Coccus that are congregated on its bark. The only difference discernible between unaffected trees and this, is that the bark of the latter is covered with low, warty excrescences, in which the greater part of the Coccus congregate. These warts are no doubt a result of the insects' possession, but that they are harmful is another question. If they are responsible for the decay of the bark of beech-trees and their subsequent death, one would expect that some indication of bark decay would be apparent in this instance. But it is not.

"Still more interesting is the fact that old beech-trees in the vicinity of this young one occasionally die as they stand and some of these have not one Coccus on the bark. Two old trees within less than a stone's-throw indicate by their foliage and growth that two to five years hence will see the limit of their life. One of these has a very few Cocci here and there on its bark, which is dying in patches; the other is quite free from Coccus, and it has reached the stage when the bark is so badly decayed that pieces are falling off. Experience shows that trees such as these are decayed at the roots, a result of old age, possibly accelerated by unsuitable soil, especially when too wet. It seems to me that if the insect is indigenous, there is not much fear of its being greatly mischievous to its host. We know that its relatives, the Kermes of

the *Quercus coccifera*, and the cochineal insect, in the case of the *Opuntia*, effect no appreciable harm on these plants."

This article is of peculiar interest, as it was written from Tyninghame and refers to the same affected beech-woods, to which attention was drawn by the Earl of Haddington in 1863 in the letter to Prof. Balfour quoted in extract above.

On December 28th, 1910, Mr. Brotherston, replying to a request for information as to the present state of the beech-trees at Tyninghame, states that he notices very little difference from the condition which prevailed in 1903. He says, however, that nowhere in Scotland has he observed trees so thickly coated with Coccus as he has seen them in Herefordshire. In his letter, Mr. Brotherston refers to the death of trees in Scotland, obviously due to causes other than Coccus, as follows:—"At the same time large numbers of beech-trees have been dying and others are approaching death on many estates. It is not a question of soil, for trees growing in almost pure sand go as fast as those which have a clayey loam to root in. The symptoms, which are at first apparent, are leaves which year by year diminish in size till a spring arrives when they fail to appear, or sometimes appear to shortly wither away. When the tree is felled the main roots are usually in a condition approaching rottenness and sometimes the centre of the trunk is also rotted. But there are influences that account for these conditions. The trees are (perhaps) invariably aged for beech. Those which die at Tyninghame are over or nearly 200 years of age. At Mellerstain, Berwickshire, they are a few years younger. Protracted drought is very harmful . . . . Trees in a decaying condition also bear enormous crops of mast, not every year, but sufficiently often to lessen the vitality of the trees.

In the "Journal of the Board of Agriculture" for November, 1910, pp. 642–3, an article occurs in which a reference is made to the presence of *Cryptococcus fagi* in the forest of Charbonnière, Belgium; in this reference it is said that the disease is not taken seriously by the Belgian forester.

A full account of *Cryptococcus fagi*, its life history &c., is to be found in "A Monograph of British Coccidae" by R. Newstead, vol. ii., pp. 215–221, plate lxx., figs. 1–10. Leaflet No. 140 of the Board of Agriculture also deals with the insect, and the treatment of the disease; and an account of recent observations on the distribution of the Coccus in beech-woods is given by the Board of Agriculture and Fisheries in the Annual Report of the Intelligence Division, Part II, for the year 1909–10.

Personal Observations.

In the following notes on a selection of the beech-woods visited, the condition of individual trees is dealt with.

Ashridge Woods.—These, the property of Earl Brownlow, were visited on April 7th, 1910, when Mr. Wheatley, the agent, very kindly allowed the forester to accompany us. Our attention was first directed to a wood composed principally of old beech-trees. Most of these had been pollarded in their youth, and many were in

various stages of decay. The soil was shallow and heavy, overlying chalk. All through the wood large numbers of trees were in bad condition, and several were dead, but the majority carried no large amount of Coccus. Fungi occurred on the bark in many cases but those noted were saprophytic species. We were told that the Coccus had been noticed on the estate for thirty years, but that it had not increased rapidly until from twelve to fifteen years ago. For old trees, some were quite as healthy as could be expected; others were in a bad state of decay. A small amount of Coccus was seen on most of the trees, but, except for three badly-infested specimens it was in no greater quantity than may be found in many plantations which show no signs of injury.

Of the three trees bearing the largest amount of Coccus, one was as healthy as other trees of the same age on the estate, or in woods or parks elsewhere. The second was in fair health, but the growth made in 1909 was shorter than in the previous case, while the third tree was in bad health, and had several dead and broken branches, and dead patches of bark. There were many trees in the wood in a similar condition, but which bore little or no Coccus. On other parts of the estate a little Coccus was noticeable here and there. In a plantation of trees about thirty years old (near the *Sequoia* Avenue) there was a fair amount of Coccus, but it did not seem to be doing any serious damage; a few trees were dead, but that was due to overcrowding. In this case the Coccus was not confined to trees of a particular character, and some of the most vigorous trees had as much Coccus as any. We asked that this plantation might be kept under observation with a view to ascertaining the effect of the disease on quite young trees.

Chenies Woods.—These occupy a portion of the Duke of Bedford's Buckinghamshire estate, and they were visited on April 12th, 1910. Taken as a whole, the trees on this estate were remarkably healthy. Here and there a specimen was noted carrying a fair amount of Coccus, and a number of trees were seen which had broken off at about twenty feet above the ground. A small amount of Coccus was widely distributed on the trees, as elsewhere, but badly affected trees were few in number, isolated, and far apart. Where the Coccus was abundant, the trees, or parts of them, appeared to be unhealthy from other causes, at any rate, in many instances; and the same trouble was found to exist on trees which carried little or no Coccus. Cases were seen in which there was a dead strip of bark free from Coccus, while adjacent healthy bark was covered with Coccus. Many trees were seen on which the bark was dead or dying, and peeling off at about fifteen or twenty feet from the ground. Some of these had Coccus on, others had none, and bore no signs of having had any. The cause of injury could frequently be traced to a wound.

Dead bark full of a fungus was often seen near a stump of a branch, the fungus being also present in the wood. Where the bark was dead at fifteen or twenty feet from the ground, the bark at the base was in good condition. In other cases dead patches of bark were found about the bases of the trunks and the roots, while the bark higher up was healthy.

In cases like the latter a small black fungus (*Melogramma spiniferum*) was found on the dead bark. Where the bark dies higher up, there is often a minute reddish fungus (*Nectria ditissima*) present. These species have been identified by Mr. Massee; both are parasitic,* and appear to account for the death of many trees. The same conspicuous saprophytic fungus, noted in the Ashridge Woods, was also found here on the dead and dying trees.

Micklefield Hall Woods, Rickmansworth.—Mr. Clutterbuck, the owner of these woods, kindly accompanied us on April 19th, 1910, and pointed out various diseased trees which he had had under observation. We first examined two beech-trees standing on the edge of a wood, the trunks being within a few feet of one another and the branches interlaced. In the case of one tree, parts of the stem and main branches were thickly covered with Coccus, while the other tree was almost free from it. The two trees had remained in about the same state for some years, and, as far as one could judge, they were both fairly healthy. They are admirably placed for observation, and Mr. Clutterbuck intends to note carefully any changes in their condition which may occur. Most of the trees in the vicinity were fairly free from Coccus, with the exception of one middle-aged tree, which stood at about one hundred yards from the two trees mentioned above. There was a large amount of Coccus on this tree, but the growth of the tree appeared normal. On ascending the tree, it was found that there was a large patch of dead bark running down the trunk in an irregular manner for a distance of two or three feet. This dead bark originated just below a wound, and there was nothing to show that it had any connection with the Coccus.

Coccus was also noted on other parts of the estate, but was nowhere so bad as on the trees already referred to. On the outskirts of a distant wood, we were told that a bad tree had been cut down two or three years ago; close to where this tree stood, Coccus was noticed on several trees, but none of them were really badly attacked, and they were scattered amongst other trees which were practically clean. We were told that trees which had been killed, or were reputed to have been killed by Coccus, had very dry bark and were hard to cut. The woods were kept very free from dead trees.

Hall Place, Maidenhead.—This, the estate of Sir Gilbert Clayton-East, was visited in the company of the owner on May 19th, 1910. Our attention was directed to this estate in connection with questions referred to the Board of Agriculture, by Sir Gilbert, respecting Coccus and diseased beech-timber. The death of several large trees bearing Coccus had been reported, and samples of timber from living trees showing brown discoloration had been sent for examination. At the time of our visit, though Coccus in small quantity was fairly general, as in other districts, only a few trees had a large amount on the bark. From the general appearance of these trees, they are at present in good average health. Several dead trees

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* *Nectria ditissima* is a wound parasite. *See* Massee, "Diseases of Cultivated Plants and Trees," p. 183.

bearing Coccus were seen in other parts of the woods; these appeared to have been killed by fungus in most cases. Specimens of fungus-infested bark and wood were brought away, and the fungi were subsequently identified by Mr. Massee as being identical with the parasitic species previously recorded.

In a portion of one wood where trees were being felled, our attention was directed to dark stains which occurred in much of the timber. The stains were dark brown and usually confined to the central part of the trunk. In one or two cases local stains of this kind appeared to be connected with wounds, but in the majority of cases, in which the stain was continuous through the length of the trunk, it was probably due to the trees having experienced a severe check at some past period. Such a check might have been brought about by drought, especially as the trees had been grown on a steep hill-side in clayey ground. The following table of the rain-fall at Hall Place, for 17 years from 1893, kindly given to us by Sir Gilbert Clayton-East, shows two years, 1893 and 1898, which might well be responsible for a severe check.

1893.	78 days drought.	1900.	22·17 inches.
,,	33 ,, ,,	1901.	21·48 ,,
,,	219 days with only slight rain-fall.	1902.	20·37 ,,
		1903.	37·95 ,,
1894.	27·62 inches.	1904.	23·63 ,,
1895.	20·08 ,,	1905.	22·12 ,,
1896.	23·02 ,,	1906.	25·64 ,,
1897.	22·04 ,,	1907.	25·45 ,,
1898.	17·10 ,,	1908.	26·81 ,,
1899.	22·17 ,,	1909.	28·13 ,,

On this estate our attention was specially directed to black blister-like swellings on the trunks of beech-trees. These blisters were filled with a yellowish liquid which had an offensive smell. Some connection was suggested between them and Coccus. Similar blisters had been noted on other occasions. As a rule they are little more than from one to two inches across, and their action seems to be purely local. They appear to be of the same nature as slime-flux.

Latimer Woods.—These, the property of Lord Chesham, were visited on October 18th, 1910. In the company of the forester various infested trees were examined. There appeared to be rather more Coccus in these woods than in those already referred to, but nothing more could be learnt respecting the action of the Coccus than in former visits. A number of trees broken off from 15 to 20 feet from the ground were noted. These were similar in every respect to broken trees on other estates, and bore the same parasitic and saprophytic fungi. The black watery blisters noticed in other woods were present at Latimer, and they were attributed to the action of Coccus. This theory was not, however, borne out, for similar blisters were found on trees which showed no sign of Coccus, and one large tree which was badly blistered and had much of the bark about the base killed, was practically free of Coccus, and showed no signs of ever having carried any. This tree was, however, reputed to have been brought to its present condition by Coccus, which was assumed to have been previously present.

In addition to the estates referred to, notice has been taken of the disease in various parts of Lancashire, Cheshire, Norfolk, South Wales, Scotland, &c. An interesting case was noticed at Sandringham. A tree about 40 years of age was covered with Coccus more thickly than any tree noted elsewhere. The leaves and young growths appeared to be quite healthy ; the tree however, for various reasons, had to be cut down, and on the timber being split up, it was found to be as clean and as full of sap as unaffected trees could be expected to be.

Microscopic Investigations.

A microscopic examination was made of numerous specimens of bark from trees badly affected with Coccus and from clean trees, also from pieces of bark thickly coated with Coccus and from bark of the same trees where little or no Coccus was present. Among these specimens differences were noted as regards the amount of sclerotic tissue in the bast, and the amount of cell-contents in the young bast ; but in neither of these particulars did there appear to be any constant character associated with the presence or absence of Coccus. Here and there under a small thick patch of Coccus a brown spot was found in the bark. This often included a few dead cells near the surface and showed a layer of cork dipping a little deeper than elsewhere, but the greater part of the bark appeared to be unaffected. Sucking tubes of the insects were met with here and there in the outer tissues of the bark, sometimes reaching to a depth of one millimeter.

In a certain number of trees small watery blisters are found on the lower part of the trunks, and are attributed by some people to the action of the Coccus, but no connection between the two was found.

Summary.

There can be no doubt that the Coccus is widely distributed about the country at the present time, as it has been for the last 50 years. It is also equally evident that it has, on the whole, increased in quantity during the last 15 years, but that it is doing any serious amount of harm, or that it is likely to do so, is doubtful. In some of the early records the disease appears to have been quite as plentiful as it has been of late years, and to have caused the same uneasiness, but the worst expectations were never realised.

There can also be little doubt that climatic conditions, varying from time to time, favour its increase or decrease. The recent increase of the disease may probably be accounted for by the series of mild winters which succeeded the severe one of 1894–5. This may have favoured the spread of the Coccus on trees, which had been weakened by the succession of dry summers commencing with 1893. Beech-trees in many parts of the country showed signs of deterioration as an effect of these droughts. On the other hand, the Coccus appears to have made scarcely any progress during 1909–10 in most districts. This may be explained as due to the winter of 1909 being the most severe for several years past, and the summers of 1909 and 1910 being wet and cold. These conditions

were probably unfavourable to the growth of the Coccus. Thus drought and mild winters would appear to provide the exact conditions under which it is possible for the Coccus to thrive, whilst enfeebled health of the trees (due primarily to drought and in some cases accelerated by old age) makes them peculiarly susceptible to insect attacks.

From what we can learn, however, the Coccus appears to cause very little real harm by sucking the juices of the trees, though doubtless, if an already enfeebled tree is badly infested, a certain amount of further injury must take place, for it is not in a condition to spare even the small amount of food-substances which the insect requires.

The insect may thus be regarded as doing a small amount of harm by extracting sap from the outer bark, but any injury it may cause would be infinitesimal when compared with Saw-flies and other leaf-eating insects and with various fungoid pests.

That the Coccus has not assumed an epidemic stage is apparent everywhere, for, though scores of trees may be found carrying traces of Coccus, it is only a tree here and there that is badly affected, and those trees are usually far apart.

In much that has been written on the subject, it appears to have been taken for granted that the Coccus eventually kills the trees on which it finds a home, and the same opinion prevails largely amongst foresters and other people. But there is very little evidence to prove that careful observations have been taken of particular trees, to ascertain whether death can be traced directly to the insect, or whether some other less conspicuous agency may not have played the responsible part and been wholly or partially the cause of death. Further, it is difficult to obtain reliable information as to the length of time a tree, which is said to have been killed by Coccus, lived with a considerable amount of Coccus on the bark. Some people assert that a period of seven or eight years is required to kill a tree after the disease has obtained a footing ; others maintain that three or four years is quite long enough, whilst still others have known trees to be thickly covered for a period of from 12 years upwards, and be vigorous still, as in the case of the tree mentioned in Mr. Brotherston's article. Trees at Kew have been known to bear Coccus for at least 20 years, and no serious effects have been traced to it.

The conclusion we have arrived at is that while the Coccus is doing very little harm, certain fungoid pests account for a serious amount of injury, which is usually credited to Coccus. On all the dead trees pointed out to us as having been killed by Coccus, we found destructive parasitic fungi present, which alone would account for the death of trees. The same fungi kill or injure other kinds of trees on which the Beech Coccus does not occur.

Two parasitic species were common. In cases where the trees had broken off 15 or 20 feet from the ground, in the region where the fructification of the fungus (the wound parasite, *Nectria ditissima*, Tul.) was most prevalent, patches of a dull red colour were seen on the bark. They were not conspicuous and might be easily overlooked. The patches were due to numerous minute, red, granular lumps, which form the fructification of the fungus. The

roots and bases of the trunks of such trees were quite healthy. It is of interest to note that a section of beech-wood shown in the Forestry Section of the Glasgow Exhibition, which is said to have been cut from a tree killed by Coccus, has its bark thickly covered with the fructification stage of *Nectria*.

Other instances of dead trees occurred where the roots had died first. A black fungus (*Melogramma spiniferum*, De Not.) was present in this case, and was seen breaking through the bark of the exposed parts of the roots and the base of the trunk.

It has been frequently noted that such trees die suddenly, soon after the leaves expand, or during the summer. This may be accounted for by the fungus, which has been present for a long period, and has affected the health of the trees, at last becoming so abundant as to prevent the efficient working of the conducting tissues at a time when they ought to be working at full pressure.

The fructification of the black fungus referred to above, though larger than the *Nectria*, is also small and not very conspicuous.

A conspicuous fungus was present on a large number of dead and dying trees and was often seen accompanying the *Nectria*. The fructifications are greyish, fan-shaped, and often two or three inches across. It has been identified as *Polyporus adustus*, Fr., and though it may be purely saprophytic and not harmful to living trees, it has been suspected of having parasitic tendencies. (Massee, Diseases of Cultivated Plants and Trees, p. 387.)

Trees attacked or killed by the *Nectria* or the *Melogramma* are a serious source of infection to other trees, and ought to be removed and burnt at once, and not be left lying where they fall as is too often the case.

The fact of certain trees dying as they stand probably accounts for the hardness of the wood and bark, which has been noted by some people, and has been attributed to the action of the Coccus.

The Weymouth Pine, *Pinus Strobus*, is subject to attack by an insect, which protects itself with a waxy covering, and thus resembles the Beech Coccus. This has led to the belief that a connection exists between the disease on the two trees. This, however, cannot be the case, for the Weymouth Pine insect is known to be a species of *Chermes* (*C. strobi*) and thus belongs to a different group of insects from the Beech Coccus.

Regarding isolated park trees, these are often past their prime, and sometimes suffering from injuries caused by storms, etc. Coccus, when present, is usually put down as the cause of ill-health, when such occurs, but really it is only one of several things which may be tending to lessen the vitality of the trees. Apart from the extraction of sap, the presence of a dense accumulation of Coccus on the bark is probably injurious ; therefore, even though Coccus may not do any serious harm, it is advisable to remove it in the case of park and garden specimens at any rate. This may be done by spraying or washing the trunks of affected trees with paraffin emulsion or a caustic wash as recommended in the Board of Agriculture leaflet. At the same time it is necessary to take steps to combat other and more serious diseases which may be present, and as far as possible to repair at once any damage which may be done by storms or other agencies. As previously stated diseased

trees in woods should be removed as soon as noticed, unless the injury is of a trifling character and can be easily treated.

The frequency with which trees broken off at from 15 to 20 feet from the ground are met with appears to us to require more than passing notice. The fact of their breaking at this point is due to the wood becoming rotten in this region though it is healthy above and below. As the fructification of *Nectria ditissima* is chiefly to be seen in the same region, it is thought that this fungus may be principally responsible for the rottenness of the wood. The fungus being a wound parasite an explanation of this localisation of attack should be attempted. Wounds made by fallen branches would account for the entrance of the fungus, but the badly diseased places would then be expected to occur on various parts of the trunk from base to summit, therefore some other cause must be looked for. It has occurred to us that this may be sun-burn following thinning of the trees. During a certain part of the day this portion of the trunk, which had hitherto been shaded, may be exposed to the sun and strongly heated, while the upper and lower parts of the trunk remain shaded. The heating would be likely to kill the bark, with the result that it would probably crack and enable fungus spores to gain an entrance.

Fructifications of *Polyporus adustus* are also common on the same region of the trunk.

The black fungus, *Melogramma spiniferum*, as stated above, is generally found on the roots and on the base of the trunk. These parts of the tree are very liable to bark-injuries by animal and human agency. Such injuries would account for the inlet of the fungus spores.

XLVI.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS LXII.

611. **Biophytum Foxii**, *Sprague* [Geraniaceae-Oxalideae]; affine *B. somnianti*, G. Don, a quo bracteis quam floribus brevioribus, sepalis pro rata latioribus minus attenuatis differt.

Herba erecta, caule 5·5 cm. longo appresse piloso. *Folia* 8, apice caulis quasi verticillata, 3·5–8 cm. longa, 3–6-juga; foliola terminalia oblique obovata, 2–3·2 cm. longa, 1·3–2·2 cm. lata, cetera deorsum sensim minora, basi truncata, intermedia subtrapezoidea, infima triangulari-ovata. *Pedunculi* 4 cm. longi, crispule pubescentes, multiflori. *Sepala* oblonga, acuminata, setula 0·5–1 mm. longa terminata, 6·3 mm. longa, 1·7 mm. lata, pilis acutis minute ciliata, extus papillato-pilosa, 7–9-nervia. *Corolla* alba, ima basi excepta gamopetala; tubus 6 mm. longus, basi foraminibus 5 triangularibus vix 0·5 mm. longis; lobi reflexi, oblongo-obovati, explanati 4·5 mm. longi, 3·5 mm. lati. *Stamina* longiora antisepala, breviora antipetala; filamenta breviora 3–3·3 mm. longa, sursum angustata, glabra, extus basi glandula vix 0·4 mm. diametro;

filamenta longiora 4·7 mm. longa, extus pilis acutis et papilliformibus minute pilosa, basi leviter angustata, vix glandulosa. *Pistillum* 1·7 mm. longum, superne per 1 mm. minute pilosum.

Peru. Described from a living plant collected by *Mr. Walter Fox*, and presented by him to Kew in 1911.

612. **Hedyotis glauca**, *W. W. Smith* [Rubiaceae-Hedyotideae]; species *H. uncinellae*, Hook. et Arn., comparabile, sed caule terete foliis lineari-lanceolatis floribus valde diversis distinguenda.

Herba (annua ?), 1–1·2 m. alta, erecta. *Caulis* simplex, teres, remote foliosus, lineis duabus fulvo-pilosis instructus, ceterum glaber, glaucus. *Folia* opposita, paulo recurva, lanceolata vel lineari-lanceolata, acuta, semiamplexicaulia, 8–15 cm. longa, 0·3–1·5 cm. lata, scabridule serrulata, supra subglabra, infra in venis numerosis distinctis plus minusve parce scabridula; stipulae cum foliis conjunctae, 3–5 mm. longae, pectinatae, pilosae. *Flores* in cymas globosas terminales et axillares 1·5 cm. diametro bracteatas multifloras dispositi, more *H. uncinellae*; bracteae lineares, ad 4 cm. longae. *Calyx* vix 1 mm. longus, glaber, dentibus quatuor subaequalibus triangularibus erectis vix 0·5 mm. longis glabris. *Corolla* infundibuliformis, 3 mm. longa, carnea, tubo brevi glabro fauce longiore, intus albo-pilosa, lobis minutis triangulari-ovatis acutis erectis. *Stamina* 4, fauci corollae inserta, inclusa, filamentis perbrevibus. *Ovarium* 2-loculare, stylo filiformi, loculis plus minusve 6-ovuliferis. *Fructus* deest.

Burma. Upper Burma: Kachin Hills; near Myitkyina, *Shaik Mokim*, 86.

India. Assam: district of Darrang; Charali, near Bishnath, *Burkill*, 32,470. Burkill records the flowers as flesh-coloured and the plant as standing up sporadically in the tall grass.

613. **Styrax Lacei**, *W. W. Smith* [Styracaceae]; species inter *Imbricatas*, Gürke, calyce brevi, annulo staminum maximo conspicua; ab aliis speciebus indo-burmanicis remota; in monographia *Styracacearum* auctore cl. Perkins prope *S. hypoglaucum* ponenda.

Arbor mediocris ?; rami robusti, longitudinaliter sulcati, 3–4 mm. diametro, juniores parce tomentelli mox glabrescentes. *Folia* alterna, petiolata, petiolo 1–1·5 cm. longo tomentello, oblonga vel elliptico-oblonga, 12–15 cm. longa, 5–7 cm. lata, apice breviter acuminata vel acuta, basi cuneata, coriacea, integra vel subintegra, minute glanduloso-denticulata, supra glabra, subtus minute cinereo-stellato-tomentella, supra nervis venisque subimmersis (in sicco) subtus satis prominentibus; nervis lateralibus 5–8-jugis parce stellato-pilosulis ad marginem non pertinentibus subparallelis. *Inflorescentia* racemosa vel subpaniculato-racemosa, 3–4 cm. longa, axillaris vel terminalis, 10–20-flora; bracteae minutae, lineares; rhachis stellato-tomentella. *Flores* (albidi ?) circiter 1 cm. longi; pedicelli 2 mm. longi. *Calyx* cupuliformis, brevissimus, 1 mm. longus, 3 mm. latus, margine subinteger, vix denticulatus, tomentellus. *Corolla* 5-partita, tubo brevissimo, lobis in aestivatione imbricatis membranaceis 8 mm. longis 4 mm. latis lanceolatis extus minute tomentellis intus parcius. *Stamina* 10, inferne in tubum glabrum 6 mm. longum cohaerentia, filamentorum parte libera antheris multo breviore; antherae in tubo fere sessiles, margine stellatis

pilis parce ornatae. *Ovarium* immaturum obovoideum, tomentellum, in juventute 3-loculare, stylo in parte inferiore piloso ceterum glabro, stigmate subtrilobato. *Fructus* deest.

BURMA. District of Katha: Kadu Hill, 1000–1300 m., *Lace*, 5107, in Herb. Kew. et Calcutta.

614. **Solandra Hartwegii**, *N. E. Brown* [Solanaceae-Atropeae]· affinis *S. guttatae*, Don, sed foliis et calyce glabris, corolla majore, tubo breviore differt.

Frutex ramosus; rami 8–10 mm. crassi, glabri. *Folia* alterna, plus minusve aggregata, glabra; petiolus 2·5–8 cm. longus, supra leviter bicanaliculatus; lamina 10–17·5 cm. longa, 4·5–12 cm. lata, elliptica, acuta, breviter acuminata vel obtusa, basi acuta. *Flores* solitarii, terminales. *Pedicelli* 1·2–2 cm. longi, 8–10 mm. (siccati 5–7 mm.) crassi, in calyces sensim transientes, glabri. *Calyx* 5–7 cm. longus, 2–2·2 cm. diametro, 5-angulatus, inacqualiter 3–4-lobus, glaber, viridis. *Corolla* 20–25 cm. diametro, lutea, vittis 5 fusco-purpureis notata, glabra; tubus calyce multo longior, infra medium cylindrico-tubulosus, supra medium late infundibuliformis; limbus 5-lobus; lobi 7–8·5 cm. longi, 5–7 cm. lati, oblongi, apice rotundati, integri vel inaequaliter lobati, plus minusve crispati. *Stamina* 9–10 cm. longa; filamenta ad insertionem villosa, lutea; antherae 1·2 cm. longae, pallide brunneae. *Stylus* 16–25 cm. longus, glaber, apice purpureus. *S. grandiflora*, Benth. Pl. Hartw. p. 69, nec Swartz.

MEXICO. Llano Verde, *Hartweg*, 500, and cultivated specimen.

This fine species was originally discovered by Hartweg in 1839 and mistakenly identified with *S. grandiflora*, Sw., and subsequently with *S. guttata*, Don, from both of which it is entirely different. A living plant of it was introduced from Mexico over 30 years ago by Mr. Moxam, formerly of Leyton in Essex. This plant or a portion of it was obtained and cultivated as *S. grandiflora* by Mr. J. C. Daubuz, at Truro, in Cornwall, whence it was obtained by Sir Frederick Moore, Keeper of the Royal Botanic Gardens, Glasnevin, Dublin, who forwarded it to Kew for determination.

615. **Veronica Birleyi**, *N. E. Brown* [Scrophulariaceae-Digitaleae]; affinis *V. spathulatae*, Benth., sed ramis crassioribus, foliis subsessilibus et pedunculis multo brevioribus differt.

Suffrutex nanus, 10 cm. altus, ramosus; rami erecti, saepe flexuosi, 1–2 mm. crassi, puberuli demum sublignosi et glabri. *Folia* conferta vel inferiora ad 4 mm. remota, subsessilia, crassa, 6–9 mm. longa, 4–9 mm. lata, cuneato-obovata vel orbiculata, basi plus minusve cuneata, breviter et obtuse 3–7 loba, utrinque puberula, rubrotincta. *Flores* pauci, magni, prope apicem ramorum axillares. *Pedunculi* 2–3 mm. longi, 1–2-flori, bibracteati; bracteae 4–5 mm. longae, lineari-spathulatae, obtusae, glanduloso-puberulae. *Pedicelli* 1–1·5 mm. longi, glanduloso-puberuli. *Calyx* 4-partitus; lobi 5–6 mm. longi, 2·5–2·75 mm. lati, oblongi, obtusi, glanduloso-puberuli. *Corolla* "magna, 5-mera, alba" (*Gibbs*). *Capsula* 5 mm. longa, 4–4·5 mm. lata, glabra, in lobos oblongos obtusos 4 disrupta.

NEW ZEALAND. South Island: between rocks on the top ridge of Mount Bonpland, near Lake Wakatipu, 2435 m., Feb., 1908, *Miss L. S. Gibbs*, 1172.

Allied to *V. spathulata*, Benth., but differs in having much stouter branches, subsessile leaves, a finer and entirely different pubescence and very much shorter peduncles. The corolla, according to Miss Gibbs, was white, about $\frac{3}{4}$ inch in diameter, with 5 subequal lobes; several were collected, but unfortunately they were lost. The name is given in honour of Mr. Harry Birley, a well-known guide in the district, who accompanied Miss Gibbs when this plant was collected.

616. **Alloplectus (Nautilocalyx) hirsutus**, *Sprague* [Gesneriaceae-Cyrtandreae]; affinis *A. Forgetii*, Sprague, a quo foliis brevius petiolatis viridibus basi cuneatis marginibus planis recedit.

Herba e basi ramosa, circiter 5 dm. alta, caulibus pluribus erectis teretibus crassis carnosis breviter villosis 1–1·2 cm. diametro, internodiis 2–6 cm. longis. *Folia* oblanceolata, breviter acute acuminata, apice recurvula, basi cuneata, 15–16 cm. longa, 6 cm. lata, plus minus bullata, supra nitidula, nervo medio inferne pilosulo excepto glabra, nervis venulisque supra conspicue impressis subtus prominentibus breviter villosis; nervi laterales utrinque 10–11; petioli plano-convexi, supra leviter excavati, 1·8–3 cm. longi, circa basin 6–7 mm. lati. *Cymae* sessiles, instar fasciculorum, 4–8 florae; bracteae transversae 2 cm. longae, 6 mm. latae, extus breviter villosae; pedicelli sub anthesi vix 1 cm. longi, demum aucti. *Calycis* segmenta ovato-lanceolata, acute acuminata, 1·8–2 cm. longa, 5·5–6 mm. lata, extus breviter villosa; segmentum posticum calcare corollae basi repulsum. *Corolla* pallide flava, 3 cm. longa calcare excluso, extus breviter villosa; tubus 3·2 cm. longus calcare incluso, ab 0·8 cm. usque ad 1·3 cm. supra basin organicam ampliatus, abhinc usque ad os 9·5 mm. latus, a dorso usque ad ventrem 7 mm. metiens, intus antice glaber, postice minute glanduloso-pilosus; calcar amplum, rotundatum, 3 mm. longum, 4·5 mm. latum; limbus 1·5 cm. latus, a dorso usque ad ventrem 1·3 cm. metiens; lobi transverse elliptici, patuli. *Filamenta* in vaginam postice fissam corollae tubo adnatam connata, basi praecipue postica extus glanduloso-pilosa, vagina antice 0·8 mm. alta, lateraliter 0·5 mm. alta; antherae 1·75–2 mm. longae, loculis omnino sejunctis parallelis mytiliformibus, connectivo crasso convexo 1·75 mm. longo 1·3 mm. lato. *Disci* glandula unica, postica, ovata, glabra, 2·4 mm. longa, basi vix 2 mm. lata. *Ovarium* 3 mm. longum, pilis multicellularibus acutis villosum; stylus pilis aliis glanduloso-capitatis aliis longioribus acutissimis dense indutus; placentae ad basin bipartitae, segmentis plano-convexis introrsum tantum ovuliferis.

Peru. Collected by *Forget* for Messrs. Sander & Sons, St. Albans, by whom a plant was presented to Kew.

617. **Alloplectus (Nautilocalyx) pallidus**, *Sprague* [Gesneriaceae-Cyrtandreae]; foliis magnis pallide glaucescenti-viridibus specie glabris, petiolis brevibus necnon corollae colore distinctus.

Herba e basi ramosa, circiter 5 dm. alta, caulibus pluribus erectis teretibus crassis carnosis nitidulis breviter pilosis inferne circiter 1·7 cm. diametro superne 8–9 mm. diametro, internodiis 3·5–7·5 cm. longis. *Folia* opposita, ovato-lanceolata, apice breviter acute acuminata, recurva, in basin sensim angustata, 16–25 cm. longa, 6·5–10·5 cm. lata, margine plana, crenato-serrata, sparse ciliata, supra nitidula, pallide viridia, pilis paucis appressis inconspicuis

exceptis glabra, nervis venulisque conspicue impressis, subtus opaca, albido-viridia, prima visu glabra, revera nervis sparse puberulis mesophyllo minutissime puberulo, nervis prominentibus, lateralibus utrinque 12–14, venulis prominulis ; petioli 0·8–2 cm. longi. *Cymae* 3–6-florae, bracteis duabus transversis patulis lanceolatis acutis primum circiter 8 mm. longis demum usque ad 1·5 cm. longis sparse ciliatis extus puberulis intus glabris ; pedicelli sub anthesi circiter 2·5 c.m. longi, villosi, demum elongati. *Calyx* zygomorphus ; segmenta ovata, acute acuminata, basi rotundata vel subcordata, 2·4–2·5 cm. longa, 1·4-1·7 cm. lata, tenuia, denticulata, sparse ciliata, extus sparsissime puberula, intus glabra ; segmentum posticum calcare corollae basi repulsum valde curvatum. *Corolla* e calyce ascendens, cremeo-albida, dorso calcarata ; tubus calcare incluso 5 cm. longus, extus breviter crispule pilosus, intus antice glabriusculus, purpureo-striatus, postice minute glanduloso-pilosus, purpureo-vittatus, vittis e maculis numerosis subcontiguis compositis, circiter 1·5 cm. supra basin calcaris ampliatus, abhinc usque ad os 1·1 cm. latus, a dorso usque ad ventrem circiter 9 mm. metiens ; calcar amplum, rotundatum, circiter 5 mm. longum ; limbus 3 cm. latus, fere 3 cm. a dorso ad ventrem metiens ; lobi leviter reflexi, transverse elliptici, 1·1–1·2 cm. longi, 1·4–1·6 cm. lati. *Filamenta* in vaginam postice fissam in calcar 3 mm. productam corollae tubo adnatam connata, superne antheris disjunctis spiraliter torta, antica longiora, vagina antice 7·5 mm. longa, lateraliter 5 mm. longa ; antherae per paria apicibus connectivorum connata, 3 mm. longae, connectivo dorso valde incrassato 2·5 mm. longo 1 mm. lato ultra loculos 0·5 mm. dorsaliter prominente, loculis omnino sejunctis parallelis mytiliformibus. *Disci glandula* unica, postica, 2·5 mm. longa, sparse longiuscule ciliata. *Ovarium* ovoideum, 5 mm. longum, pilis multicellularibus acutissimis dense indutum ; stylus vix 3 cm. longus, pilis multicellularibus acutissimis et paucioribus glanduloso-capitatis patule hirsutus ; placentae ad basin bipartitae, segmentis plano-convexis introrsum tantum ovuliferis.

Peru. Collected by *Forget* for Messrs. Sander & Sons, St. Albans, by whom a plant was presented to Kew. The corolla is creamy white, with a broad band of purple blotches inside the tube on the posticous side and about 9 purple lines on the anticous.

618. **Staurogyne shanica**, *W. W. Smith* [Acanthaceae-Nelsonieae]; inter species orientales proxima *S. debili*, Clarke, ex insulis Philippinis, speciei imperfecte descriptae ; foliis coriaceis, subtus tomentellis, inflorescentia magis contracta inter alia distinguenda.

Herba 15–20 cm. alta, suberecta. *Caulis* simplex vel parce ramosus, teres, nodosus, dense fulvo-tomentellus. *Folia* opposita, lanceolata vel oblongo-lanceolata, apice obtusa, basi cuneata, 4–8 cm. longa, 1–2·5 cm. lata, margine paululum undulata, coriacea, supra minute scabridula, in costa tomentella, subtus praesertim in venis dense tomentella, supra nervis immersis indistinctis subtus conspicue reticulatim prominentibus 6–10-jugis ; petioli ad 1 cm. longi, tomentelli. *Flores* in racemos terminales vel pseudo-axillares vix elongatos 8–15-floros dispositi ; bractea bracteolaeque duae similes, lineares, 2–3 mm. longae ; pedicelli 2–3 mm. longi. *Calyx* 5-partitus, in lobos lineares 6–8 mm. longos minute pilosulus. *Corollae* tubus 1 cm. longus ; lobi subaequales, rotundati, breves. *Stamina*

didynama, filamentis undique sed parce pilosis. *Fructum* maturum non vidi.

Burma. Southern Shan States: near Keng Tung, 1000 m., *Macgregor*, 755 bis, in Herb. Kew. et Calcutta.

619. **Fimbristylis Lacei**, *Turrill* [Cyperaceae-Scirpeae]; affinis *F. distichae*, Bcklr., sed anthelae radiis pubescentibus, glumis angustioribus acutioribus differt.

Planta annua; culmi erecti, ad 12 cm. alti, graciles, basi foliati. *Folia* numerosa, linearia, curvata, apice acuta, ad 7 mm. longa, 2 mm. lata, glaucescentia, margine scabra. *Anthela* e radiis 3–6 pubescentibus, spiculis 3–7 constituta; bracteae breves, foliosae. *Spiculae* 6–8-florae, 5–7 mm. longae, 1·5 mm. latae, rhachilla haud torta. *Glumae* distichae, cymbiformes, 2·5 mm. longae, 0·75 mm. latae, minute puberulae, brunnescentes, carinis angustis scabris, ad margines anguste membranaceae. *Stamina* 2, filamentis 2·75 mm. longis, antheris linearibus 0·6 mm. longis haud apiculatis. *Stylus* 1·5 mm. longus, glaber, cum basi incrassata deciduus, ramis 3, 1 mm. longis. *Nux* obovoidea, faciebus 3 convexis, 0·75 mm. alta, 0·6 mm. diametro, alba, vix verrucosa, haud stipitata, cellulis epidermatis hexagono-rotundis.

Burma. Upper Chindwin District: Sittung; Tammu Road, 150 m., *Lace*, 4210.

Malay Archipelago. Borneo: Tenom; "Residency," burnt clearing paths, 240 m., *Gibbs*, 2771.

620. **Fimbristylis tortispica**, *Turrill* [Cyperaceae-Scirpeae]; ab affini *F. disticha*, Bcklr., partibus omnibus majoribus, spicularum rachillis tortis facile distinguenda.

Rhizoma nullum vel brevissimum. *Culmi* erecti, ad 5 dm. alti, rigidiusculi, basi dense foliati quasi bulboso-incrassati. *Folia* numerosa, linearia, plus minusve curvata, apice obtusa, minute apiculata, ad 13 mm. longa, 2·5 mm. lata, glauca, margine scabra. *Anthela* radiis ad 7 laevibus. *Bracteae* breves, ad margines ciliato-scabrae. *Spiculae* 9 mm. longae, 2 mm. latae, rhachilla semel vel saepius bis torta. *Glumae* subdistichae, late ovatae, mucronatae, 3 mm. longae, 2·5 mm. latae, glabrae, in parte superiore castaneae in parte inferiore et ad carina stramineae, ad margines anguste membranaceae. *Stamina* 3, filamentis 3 mm. longis, antheris linearibus 1·5 mm. longis apiculatis. *Stylus* 2 mm. longus, glaber, cum basi incrassata deciduus, ramis 3 gracilibus, 2 mm. longis. *Nux* obovoidea, faciebus 3 convexis, 1 mm. longa, 0·75 mm. diametro, alba vel straminea, verrucosa, non stipitata, cellulis epidermatis hexagono-rotundis.

Indo-China. Siam: Chiengmai; Doi Sootep, growing singly in deciduous jungle, 330–540 m., *Kerr*, 1271.

XLVII.—MISCELLANEOUS NOTES.

Mr. Thomas Hunter, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a Curator in the Agricultural Department of the Gold Coast.

Peat-Moss Litter Manure.—The supply of farmyard manure for use in the Royal Botanic Gardens, Kew, is obtained in the neighbourhood from contractors, bus proprietors, and others who keep a number of horses. For some years a considerable proportion of the manure thus obtained has been made with peat-moss litter, imported we believe from Denmark, and composed chiefly of compressed dead moss and bog peat, as it has been formed in marshes, &c. It is neither peat nor moss as these are understood in horticulture and is entirely unsuited for the growth of plants. It is imported in the form of bales which are broken up in the stables to be spread as bedding in the stalls. When it becomes saturated with urine and contains a considerable proportion of horse droppings it is thrown into a heap to be carted away. Compared with straw-made manure this moss-litter manure is cheap, but it is not looked upon with favour by market gardeners. Its use at Kew has been mainly as a top dressing for lawns and borders, but only after it has been exposed to the air for about six months and turned several times. It has not been used for mixing with the soil, but this spring some of the flower beds were in error manured with it. Its effect on the health and growth of the plants which were afterwards put into these beds for the summer was markedly deleterious. The plants not only failed to start into growth, but many of them weakened and died, and as this was evidently due to the manure in the soil in which the plants were set, samples of the soil and manure were submitted to Dr. J. A. Voelcker for analysis and report, and we are indebted to him for the following analysis and observations.

Dr. Voelcker writes as follows :—

"I have now completed my examination of the sample of Soil and that of Peat-Moss Manure which you sent me some time back.

"The analysis of the Peat-Moss Manure is as follows :—

Moisture	39·59
*Organic matter and salts of ammonia	46·87
Oxide of iron and alumina, with traces of phosphoric acid	1·49
Lime	·90
Alkalies, magnesia, &c.	4·81
Insoluble siliceous matter	6·34
	100·00
*Containing nitrogen	2·11
Equal to ammonia	2·56

"The manure further contained :

Matters soluble in water—

Nitric acid	·01
Sulphuric acid	·33
Chlorine	·09

"The manure was distinctly acid in reaction, and showed :—

Acidity—reckoned as acetic acid ... ·88 per cent.

"Of the soil a water extract was made, and this gave :—

Total matters soluble in water ... ... ·098 per cent.

"Of this ·046 per cent. consisted of organic matter, and ·052 per cent. of mineral matter, this latter being mostly sulphate of lime. There was only a trace of chlorine in it but a marked quantity of nitrates was present.

"In the examiation of the manure and soil alike there was not detected anything leading to the belief that disinfectants, deodorisers, &c., had been used with the manure.

"To come next to anything that may possibly have caused the losses experienced with the plants in consequence of using the manure in question—it does not appear, from my examination, that any mineral acid or the like has been used with the manure, nor do I think that any disinfectant, such as carbolic acid, has been employed with the manure. Yet the evidence you have kindly collected and put at my disposal does undoubtedly tend to show that ill results have followed the use of this particular manure. I have, therefore, carefully considered the matter from the light of practical experience and supplemented this with such facts as the analyses have brought out.

"Undoubtedly there is a strong prejudice among gardeners, and market gardeners in particular, against the use of farmyard manure made with Peat-moss litter. To what that prejudice is due I have not been able exactly to find out. But there remains the fact that market-gardeners will not use this manure until it has been kept stored for a considerable time—say quite two years. After that time it is reckoned safe to use. You inform me that the manure in question was not absolutely fresh but had been kept some time, though, it would appear, nothing like the two years mentioned.

"I have come to the conclusion—from my examination—that the ill effects in the present case are due to the marked acidity of the manure, this acidity being due to organic acids in the manure and not to mineral ones. I find in the soil (in which the manure has been used) iron compounds present in the ferrous—or not fully oxidised—condition, and it would seem to me likely that these are the result of the liberal use of an organically-acid body such as the peat-moss, and that an unhealthy, imperfectly oxidised condition of the soil has been brought about.

"Very probably if the manure be kept longer and allowed to rot more thoroughly, it becomes more aerated and oxidised, and then would not show the ill effects noticed.

"This, it seems to me, is a possible explanation of what has occurred in the present case, and it is the explanation, at least, which would suggest itself to me."

For the purpose of comparison the following analysis of farmyard manure is taken from the article on Manures in the new edition of the *Encyclopaedia Britannica*, written by Dr. Voelcker.

"Farmyard manure consists of the solid and liquid excreta of animals mixed with the material used as litter. Its composition varies according to the conditions under which it is produced. The principal determining factors are: (1) the nature and age of the animals producing it; (2) the food that is given them; (3) the kind and quantity of litter used; (4) whether it be made in feeding boxes, covered yards, or open yards; (5) the length of time and the way in which it has been stored.

"This analysis represents the general composition of well-made farmyard manure in which the litter used is straw :—

Water	75·42
*Organic matter	16·52
Oxide of iron and alumina	·36
Lime	2·28
Magnesia	·14
Potash	·48
Soda	·08
†Phosphoric acid	·44
Sulphuric acid	·12
Chlorine	·02
Carbonic acid, &c.	1·38
Silica	2·76
	100·00 "

* Containing nitrogen = ·59 per cent. which is equal to ammonia ·72 per cent.

† Equal to phosphate of lime ·96.

A use for Orchid Pseudobulbs.—We have received from a correspondent in Grand Cayman, British West Indies, a pseudobulb of *Schomburgkia Thomsoniana* which is used for making tobacco pipes in the island. The pseudobulbs are about 9 inches long and make useful pipe bowls. The plant is known to the natives as "Wild Banana."

In another species (*S. tibicinus*) a native of Honduras, the pseudobulbs are between 1 and 2 feet long and quite hollow and smooth inside, and are commonly used by the native children as trumpets, whence it is called the cowhorn orchid. At their base too there is always a small hole and masses of ants and other insects take advantage of it in constructing their nests.

Botanical Magazine for September.—The plants figured are *Acineta Moorei*, Rolfe (t. 8392); *Viburnum Henryi*, Hemsl. (t. 8393); *Senecio saxifragoides*, Hook. f. (t. 8394); *Clematis chrysocoma*, Franch. (t. 8395) and *Impatiens Herzogii*, K. Schum. (t. 8396).

The *Acineta* is a new species native, as are all the other species of the genus, of South America, but the precise locality whence it was obtained is not recorded. Though closely allied to the rare *A. Hrubyana*, Reichb. f., it is easily distinguished by the flowers being more densely spotted and having distinctly broader lateral lobes to the lip. The material illustrated and described was communicated by Sir F. W. Moore, of the Royal Botanic Gardens, Glasnevin, and was furnished by a plant purchased from Messrs. F. Sander & Sons in 1903.

Viburnum Henryi is a Central Chinese species which has been introduced into cultivation by Messrs. J. Veitch & Sons, who supplied the specimen figured from a plant which flowered in their Coombe Wood nursery. It is characterised by having lanceolate

glabrous leaves, which are glandular on the underside in the axils of the primary veins, and by the pyramidal inflorescence. In September, before its coral-red fruits become black, the plant is highly ornamental.

Senecio saxifragoides is a perennial evergreen herb with nearly orbicular leaves, hoary-woolly beneath, and yellow flower-heads 1½ inch across, arranged corymbosely on scapes up to 1 foot high. The species comes from New Zealand and has been grown at Kew in an unheated frame.

Clematis chrysocoma is a close ally of the familiar *C. montana*, Ham., differing in the coarser and denser indumentum of its shoots. Its sepals are white with a pale pink margin. The Kew plant was a presentation from Mr. M. L. de Vilmorin. The species is Chinese, an attractive garden plant, but unfortunately not hardy at Kew.

Impatiens Herzogii is closely related to *I. Hawkeri*, Bull, from which it is distinguished by being glabrous, and by having vermilion-coloured flowers. It is a native of German New Guinea, and the plant from which the material for the figure was obtained was reared from a cutting sent to Kew by Sir F. W. Moore, who had received seeds from Dr. R. Schlechter.

Presentation to Herbarium.—A small collection of water-colour drawings of British Fungi illustrating the general appearance and habitat of the species pourtrayed has been bequeathed to the Herbarium of the Royal Botanic Gardens, Kew, by the late Miss Charlotte Antonia Sulivan, of Broom House, Fulham, who died in April last.

Ecanda Rubber (*Raphionacme utilis*).—In the *Kew Bulletin*, 1908, p. 209, and 1909, p. 321, a full description is given of this interesting plant, together with other details bearing upon the possibility of its eventually becoming exploited as a source of commercial rubber. From the first it was not doubted that the plant would yield good rubber, but it was pointed out that until trustworthy information could be obtained as to the rate of growth of the rubber-yielding tubers, the cultivation of the plant as a profitable crop could not safely be recommended.

This point has now been cleared up by Mr. Consul Drummond Hay in a recently-issued Diplomatic and Consular Report on the Trade of the Province of Angola for the year 1910, from which the following paragraph is taken.

"Experiments made by Europeans in the regions of Bihé, Bailunda and Ganguellas to cultivate the tuberculous rubber plant known as Bitinga (*Raphionacme utilis*) (*see* the *Kew Bulletin*, 1908, no. v., p. 209) have proved a total failure. To raise the plants in the seed beds was easy enough, but the development of the *tuba* containing the rubber was too slow."

The growth of the seedling plants at Kew has also been found to be remarkably slow.

J. M. H.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 9.] [1911.

XLVIII.—INDIAN SPECIES OF IMPATIENS.

On some Western Peninsular Indian Balsamineae collected by Mr. A. Meebold.

J. D. Hooker.

In *Kew Bulletin*, 1910, p. 291 et seq., I described a considerable number of Indian *Impatiens* for the most part collected by Mr. Meebold* in 1908, of which seven were from the Western Peninsula, especially from the Western Ghat and Mysore. Encouraged by the publication of these new and interesting species, Mr. Meebold in a subsequent Western Peninsular journey (1910) paid special attention to the *Impatiens* which he met with. On this occasion the countries visited were the Nilgiri Hills, Cochin and Travancore, and the collection of Balsams was sent to me for study and transmission to the Herbarium of Breslau, with permission to retain any duplicates for that of Kew. On examination I found the collection to consist of 21 species under 44 numbers. Of those the following six may I think be regarded as hitherto undescribed; of these three *I. herbicola*, *I. rivulicola* and *I. pallidiflora*, all from Travancore, differ from the widely distributed *I. chinensis* chiefly in the remarkably small flowers, capsules and seeds.

Conspectus of Species described.

Inflorescentia simpliciter pedicellata :—
  Folia omnia opposita, sepala 2 anguste linearia, labelli limbum aequantia :—
    Alae bilobae :—
      Labellum ecalcaratum ... ... 1. *I. herbicola.*
      Labellum calcaratum ... ... 2. *I. rivulicola.*
    Alae simplices; lobus basalis minimus ... 3. *I. pallidiflora.*
  Folia superiora verticillata; sepala brevissima :—
    Labelli calcar limbo paullo brevius ... 4. *I. macrocarpa.*
    Labelli calcar limbo multo longius ... 5. *I. cochinica.*
Inflorescentia pedunculata; pedunculi 2–4-flori ... 6. *I. verecunda.*

* Mr. Meebold's Indian researches are, I believe, in the main ethnological.

(21652—6a.) Wt. 118—9. 1125. 11/11. D & S.

1. I. **herbicola**, *Hk. f.*; sp. nov.; herba gracilis *I. chinensi*, L., affinis, differt foliis anguste linearibus 2–3 mm. latis integerrimis, floribus minutis, labello angusto ecalcarato capsulisque parvis oligospermis.

Herba glaberrima, 4–6 dm. alta, minutiflora, caule erecto terete parce ramoso, ramis erectis, internodiis elongatis. *Folia* 5–6 cm. longa, opposita, sessilia vel brevissime petiolata, coriacea, anguste linearia, acuminata, integerrima, basi truncata vel cordata; glandulae infrapetiolares minutae, subulatae vel pulvinatae, vel 0. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii vel 2–3-ni, florentes 0·5–1 cm. longi, fructiferi 2–3 cm. longi, erecti vel patuli. *Flores* 5–6 mm. expansi, albi. *Sepala* 2, linearia, acuminata, 4–5 mm. longa, uninervia. *Vexillum* orbiculare, 4 mm. latum, recurvum, costa dorso crasse carinata, apiculata. *Alae* stipitatae, 7–8 mm. longae; lobus basalis parvus, oblongus, suberectus; distalis rotundatus vel semilunaris; auricula dorsalis prominens. *Labelli* limbus scaphiformis, lanceolatus, 4–5 mm. longus, horizontalis, ecalcaratus vel imo basi subtus gibbo instructus. *Filamenta* subulata. *Ovarium* ovoideum. *Capsulae* parvae, gibbosim ovoideae, turgidae, 0·7–1 cm. longae, stipitatae, acute rostratae, oligospermae. *Semina* rotundata, compressa, 2–5 mm. diametro, nitida, atra.

Travancore. Udambanshola: in the grass, 1525 m., *A. Meebold*, 1311; Pecamode, 1372 m., *A. Meebold*, 12,924.

2. I. **rivulicola**, *Hk. f.*; sp. nov.; *I. chinensi*, L., affinis, differt foliis angustioribus, floribus parvis, labelli calcare limbo breviore capsulisque 0·8–1 cm. longis oligospermis seminibus minutis.

Herba gracilis, 2–3 dm. alta, glaberrima, parviflora, caule simplici tetragono, internodiis elongatis. *Folia* opposita, 3–4 cm. longa, brevissime petiolata, coriacea, linearia, acuta vel acuminata, integerrima vel remote minute spinuloso-serrulata, basi cordata, subtus pallida, nervis utrinque 3–4; glandulae infrapetiolares subulatae. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii vel 2–3-ni, florentes 1–1·5 cm. longi, fructiferi 2–2·5 cm. longi, deflexi. *Flores* expansi 0·5–1 cm. longii exsiccat, violacei, lobo distali alarum flavido. *Sepala* 2, anguste linearia, acuminata, 1 cm. longa. *Vexillum* parvum, orbiculare, costa dorso carinata, mutica. *Alae* 1–1·6 cm. longae, late stipitatae; lobus basalis parvus, oblongus, rectus vel decurvus, distalis semilunaris, crassiusculus; auricula dorsalis parva. *Labellum* cymbiforme, acutum; calcar limbo brevius, incurvum. *Filamenta* brevia. *Capsulae* parvae, 0·8–1 cm. longae, pendulae, sessiles, ovoideae, acuminatae, oligospermae. *Semina* orbicularia, vix 2 mm. diametro, atra, nitida.

Travancore. Puriar Valley: borders of streams, 1220 m., *A. Meebold*, 13,755.

3. I. **pallidiflora**, *Hk. f.*; sp. nov.; *I. chinensi*, L., affinis, differt ramulis saepe pubescentibus, floribus multo minoribus, alis longe stipitatis, lobo basali minimo vel 0 et labelli calcare brevi.

Herba gracilis, 3–5 dm. alta, floribus inter minores, caule erecto subsimplici, ramulis saepe pubescentibus internodiis elongatis. *Folia* 3–5 cm. longa, opposita, breviter petiolata, firma, oblonga vel lineari-oblonga, acuta vel acuminata, integerrima vel minute spinuloso-serrulata, basi truncata vel rotundata, utrinque glabra vel

puberula, subtus pallida fere glauca, petiolo 1–2 mm. longo, nervis utrinque 2–4; glandulae infrapetiolares 0 vel setaceae. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii, florentes foliis breviores, graciles, erecti, glabri vel puberuli, fructiferi foliis longiores. *Flores* ad 2 cm. expansi, rosei, exsiccati pallide flavi. *Sepala* 2, anguste linearia, acuminata, 6–7 mm. longa. *Vexillum* parvum, orbiculare, muticum, costa dorso vix carinata. *Alae* ad 1·5 cm. longae, longe stipitatae, stipite geniculatim incurvo; lobus basalis 0 vel ad basin stipitis minimus, distalis late dolabriformis, obtusus; auricula dorsalis stipiti alarum inserta. *Labelli* limbus cymbiformis, acutus; calcar limbo subaequilongum vel longius incurvum. *Filamenta* brevia, subulata. *Ovarium* sessile, rectum, anguste ovoideum, acutum.

TRAVANCORE. Devicolam: straggling amongst grass on a hill top, 2134 m., *A Meebold*, 13,480.

Meebold describes this species as "almost tomentose," with pink flowers, and records that it was only seen in this locality.

4. I. **macrocarpa**, *Hk. f.*; sp. nov.; *I. cuspidatae*, Wight & Arn., affinis, sed nullibi glauca nisi foliis subtus glaucis, sepalis longe cuspidatim acuminatis, capsulis 1·5–2 cm. longis seminibusque 5 mm. longis.

Frutex? glaberrima, parviflora, ramis elongatis longe nudis patulis. *Folia* 8–10 cm. longa, longe petiolata, infima opposita?, superiora 3–5-natim verticillata, firma, obovato-lanceolata, longe acuminata, serrulata, basi setosa et in petiolum nunc sparse setaceum 3–5 cm. longum sensim angustata, nervis utrinque 6–7; glandulae infrapetiolares 0? *Inflorescentia* simpliciter pedicellata; pedicelli solitarii vel bini, florentes petiolis subaequilongi, fructiferi 5–8 cm. longi, validi, apice decurvi. *Flores* ad 1·5 cm. expansi, albi? *Sepala* 2, parva, 4–6 mm. longa, ovata, longe cuspidatim acuminata, coriacea. *Vexillum* obcordato-reniforme, 1·5–2 cm. latum, costa tenui cuspidata. *Alae* breves, sessiles; lobus basalis amplus, oblongus vel obovatus, patens vel recurvus; distalis parvus, erectus, oblongus, obtusus; auricula dorsalis 0. *Labelli* limbus profunde cymbiformis, ad 6 mm. longus, longe cuspidatus; calcar limbo bis terve longius, robustum, incurvum. *Filamenta* brevia, subulata. *Ovarium* ovoideum, obtusum. *Capsulae* 1·5–2·2 cm. longae, oblique ovoideae, sessiles, obtuse rostratae, pendulae, polyspermae. *Semina* obovoidea, 5 mm. longa, minute granulata, castanea.

TRAVANCORE. Devicolam, 1829 m., *A. Meebold*, 13,462.

Described by Mr. Meebold as 4 metres high with rather weak long branches.

5. I. **cochinica**, *Hk. f.*; sp. nov.; *I. floribundae*, Wight, affinis, differt foliis non caudatim acuminatis, sepalis minutis ovatis, alis brevibus lobis subaequalibus.

Frutex? 4–5 dm. alta, glabra vel parce puberula, ramosa, parviflora, caule ramisque divaricatis rigidis. *Folia* alterna et apices versus ramulorum fasciculata, 6–10 cm. longa, petiolata, firma, ovata vel ovato-lanceolata, acuta vel acuminata, crenata, setulis interjectis 0 vel minimis, basi in petiolum 2–4 cm. longum gracilem angustata, nervis utrinque 6–10; glandulae infrapetiolares 0. *Inflorescentia* simpliciter pedicellata; pedicelli foliis breviores, in axillis inferioribus solitarii, in supremis quasi fasciculati, fructiferi

patuli vel deflexi, 3–5 cm. longi. *Flores* expansi ad 1 cm. longi, labello pubescente. *Sepala* 2, deltoideo-ovata, ad 1 mm. longa. *Vexillum* orbiculare, 2-lobum, sinu uncinatum. *Alae* breves, ad 8 mm. longae et latae, sessiles ; lobi consimiles, late obcordati, basalis distali paullo minor ; auricula dorsalis rotundata. *Labelli* limbus cymbiformis, 6 mm. longus, horizontalis acuminatus ; calcar limbo triplo longius, gracile incurvum. *Filamenta* brevia, subulata. *Ovarium* fere rectum. *Capsulae* ad 1·5 cm. longae, breviter stipitatae, turgidae, gibbosim ovoideae, acuminatae vel rostratae, oligospermae. *Semina* late obovoidea, 2 mm. longa, pubescentia.

Cochin. Kalvalay : near a stream, under trees, 610 m. *A. Meebold*, 12,183.

6. **I. verecunda**, *Hk. f.* ; sp. nov. ; *I. eleganti*, Bedd., proxima, differt foliis minoribus basi rotundatis, pedunculo breviore gracili lobo basali alarum parvo distalique amplo et calcare labelli limbo dimidio breviore.

Herba parva, 1–1·5 dm. alta, glaberrima, flaccida, pariflora, caule simplici vel ramoso, ramis patulis. *Folia* 4–6 cm. longa, alterna, petiolata, membranacea, ovata vel ovato-rotundata, acuminata vel acuta, crenata, setulis interjectis 0, basi rotundatis, nervis utrinque 3–4, petiolo gracili, 2–3 cm. longo ; glandulae infrapetiolares 0. *Inflorescentia* pedunculata, pedunculo gracili foliis breviore apice subumbellatim 2–4- flore ; pedicelli 1–2 cm. longi, fructiferi patuli vel deflexi ; bracteae lanceolatae, 3–5 mm. longae, persistentes. *Flores* ad 2 cm. expansi, rosei, macula purpurpea ima basi alarum instructa. *Sepala* 2, late-ovata, acuminata, cuspidifera, 6–7 mm. longa, 5-nervia, basi truncata. *Vexillum* orbiculare vel late oblongum, 6–9 mm. diametro, muticum vel apiculatum, costa dorso carinata. *Alae* sessiles, 1·3–1·5 cm. longae ; lobus basalis minutus, orbicularis, ima basi distali plus minusve incumbens ; distalis amplus, trigono-dolabriformis, obtusus, auricula dorsalis obscura. *Labelli* parvi limbus orbicularis, apiculatus, 6–7 mm. diametro, horizontalis ; calcar limbo dimidio brevius, obtusum. *Capsulae* anguste ellipsoideae, fere rectae, acute rostratae, vix stipitatae, polyspermae. *Semina* obovoidea vel globosa, compressa, 2–2·5 mm. longa, dense pubescentia.

Travancore. Periakanal : on a steep mossy embankment under trees, 1372 m. *A. Meebold*, 13,125 ; Devicolam, 1829 m. *A. Meebold*. 13,934.

XLIX.—DIAGNOSES AFRICANAE : XLV.

1291. Crassula globosa, *N. E. Brown* [Crassulaceae] ; affinis *C. deltoideae*, Linn. f., sed foliis paucioribus subsphaeroideis supra applanatis dorso ecarinatis differt.

Herba carnosa, 5–6 cm. alta, caespitoso-ramosa ? *Rami* foliiferi 1–1·5 cm. longi. *Folia* circa 6, conferta, sessilia, subglobosa, supra applanata, obtusissima, ecarinata, 1–1·2 cm. longa, 1·1–1·3 cm. lata, 0·9–1·1 cm. crassa, levia, glabra, subtessellato-glauca. *Pedunculus* terminalis, gracilis, 3–4·5 cm. longus, infra nudus, superne 3-ramosus, glaber. *Bracteae* 1–2·5 cm. longae, 0·75–1 mm. latae, lanceolatae, acutae, puberulae. *Flores* perparvi, 2·5 mm. longi, ellipsoidei,

ore contracti et vix 2 mm. diametro, sessiles, in capitula parva congesti. *Calyx* 1·75 mm. longus, puberulus; lobi 1·5 mm. longi, lanceolati, acuti. *Petala* 2 mm. longa, oblonga, acuta, plana, erecta, apice recurva, glabra, alba. *Glandulae hypogynae* late cuneato-obcordatae, aurantiacae. *Carpella* compresso-oblonga, papillato-puberula; stigma sessile, luteum.

South Africa. South-western part of Cape Colony, *Pearson*, 5474.

Described from a living plant which flowered at Kew in August, 1911, collected by Prof. Pearson and Mr. N. S. Pillans during the Percy Sladen Expedition to the Orange River in 1910. The subglobose leaves, resembling small marbles flattened on one side, arranged in about three pairs on each growth, give this plant a very distinct appearance from all others known to me, but it is undoubtedly allied to *C. deltoidea*, Linn. f.

1292. **Crassula humilis**, *N. E. Brown* [Crassulaceae]; affinis *C. deltoideae*, Linn. f., sed foliis, deltoideo-ovatis patentibus nec imbricatis viridibus vix glaucis et petalis erectis differt.

Herba succulenta, 6–8 cm. alta, caespitoso-ramosa. *Rami* foliiferi 1·3–2 cm. longi, foliis 10–14 instructi. *Folia* conferta, sessilia, nec connata, 0·7–1·5 cm. longa, 0·6–1 cm. lata, 4–8 mm. crassa, deltoideo-ovata, supra subplana vel convexiuscula, dorso obtuse carinata, levia, glabra, viridia vel subcinereo-viridia, vix glauca, epunctata. *Pedunculus* terminalis, gracilis, 3·5–5 cm. longus, glaber, inferne vel prope medium bractearum paribus 1–2 instructus, apice breviter cymoso-ramosus. *Flores* perparvi, sessiles, capitato-congesti. *Calyx* 2–2·3 mm. longus, minutissime puberulus; lobi 1 mm. longi, deltoideo-ovati, obtusi. *Petala* e calyce breviter exserta, 2–2·3 mm. longa, basi connata, oblonga, subobtusa, plana, erecta, apice leviter recurva, alba. *Glandulae hypogynae* late cuneatae, apice emarginatae, albidae. *Carpella* oblonga, obtusa, glabra; stigma sessile, nigrum.

South Africa. South-western part of Cape Colony, *Pearson*, 5484.

Described from a living plant which flowered at Kew in August, 1911, collected by Prof. Pearson and Mr. N. S. Pillans during the Percy Sladen Expedition to the Orange River in 1910.

1293. **Mesembryanthemum dealbatum**, *N. E. Brown* [Ficoideae-Mesembryeae]; affine *M. obtuso*, Haw., sed foliis aequalibus crassioribus et albidis, floribus breviter pedunculatis et calyce 5-lobo bene distinguitur.

Herba acaulis, caespitoso-ramosa, ramis brevissimis 4-foliatis. *Folia* adscendentia, opposita, basi subconnata, 3–4 cm. longa, 1·5 cm. lata et crassa, obtuse trigona, obtusissima, levia, albida (nec glauca), impunctata. *Flores* terminales, solitarii, breviter pedunculati, folia vix excedentes. *Pedunculus* cum ovario obconico 1·6–2 cm. longus, basi bracteis duabus parvis compressis instructus, albidus. *Calyx* 5-lobus, albidus, lobis 1·2–1·3 cm. longis ovatis vel ovato-lanceolatis apice plus minusve gibbosis. *Petala* 2–3-seriata, 1·3–1·5 cm. longa, linearia, obtusa, pallide rosea. *Stamina* in conum erectum collecta, filamentis albis, antheris luteis. *Styli* 10, erecti, staminibus longiores, flavo-virentes.

South Africa. Little Namaqualand, *Pearson*, 6062.

Described from a living plant which flowered at Kew in June, 1911, collected by Prof. Pearson during the Percy Sladen Expedition to the Orange River in 1910.

This species would also appear to be allied to *M. cinereum*, Marloth, but the leaves of that species are described as being papillate and the flowers white and remaining open night and day, which is not the case in *M. dealbatum*, whose flowers open only in the afternoon and close during the night; they are of a pleasing pale pink colour, with a dense cone of white stamens, from which the tips of the 10 styles are exserted.

1294. **Chrysophyllum viridifolium**, *Wood et Franks* in Natal Plants, vol. vi, t. 569 [Sapotaceae]; similis *C. Welwitschii*, Hiern, sed petiolis et pedicellis duplo longioribus facile distinguitur.

Arbor 10–15 m. alta, trunco basi 1·5 m. diametro. *Folia* alterna; petiolus 0·8–1·2 cm. longus, primum cum perulis rufescenti-puberulus; lamina 2·5–10 cm. longa, 2–4·3 cm. lata, oblonga, obtuse acuminata, basi rotundata, utrinque glabra, viridis, venis numerosissimis patentissimis parallelis. *Flores* axillares, fasciculati, perparvi. *Pedicelli* 3–4 mm. longi, adpresse rufescenti-puberuli. *Sepala* 1·5–2 mm. longa, ovata vel elliptico-oblonga, obtusa, adpresse rufescenti-puberula. *Corolla* subcampanulata, ad medium 5-loba, 2 mm. longa, glabra, lobis oblongis obtusis ciliatis. *Stamina* 5, tubo corollae inserta, quam corollae lobi breviora, glabra. *Ovarium* subglobosum, dense rufescenti-pubescens, in stylum crassum brevem attenuatum. *Fructus* subglobosus, 3–3·3 cm. diametro, glaber, levis, luteus. *Semina* semilunata, 1·3–1·5 mm. longa, 0·9–1 cm. lata, compressa, acute carinata, brunnea, nitida, hilo lineari.

South Africa. Natal: Berea, near Durban, 30–90 m., *Miss Franks in Herb. Wood*, 11,636.

1295. **Stapelia similis**, *N. E. Brown* [Asclepiadaceae-Stapelieae]; persimilis *S. olivaceae*, N.E. Brown, sed floribus minoribus intra glabris eciliatis, coronae interioris lobis toto incumbentibus nec bicornutis differt.

Caules erecti, 7–15 cm. longi, 0·6–1 cm. crassi, 4–6-angulati, minute puberuli, sordide purpurei vel cinereo-virides, purpureo-maculati; anguli subdenticulati. *Flores* 3–6 ad basin caulium enati. *Pedicelli* 2·5–3 cm. longi, patentes, puberuli. *Sepala* 4 mm. longa, lanceolata, acuta, puberula. *Corolla* rotata, 1·8 cm. diametro, extra minute puberula, intra transverse rugosa, glabra, eciliata, atro-purpurea; lobi 6 mm. longi et lati, ovati, acuti. *Coronae* exteriores lobi 0·75 mm. longi, 1·5 mm. lati, transverse oblongi, integri, glabri, atrati; lobi interiores 1·3 mm. longi, lanceolati, acuti, dorso leviter gibbosi, antheris incumbentes.

South Africa. Little Namaqualand, *Pearson*, 6134.

Described from a living plant which flowered at Kew in August, 1911, collected by Prof. Pearson during the Percy Sladen Expedition to the Orange River. When out of flower this plant might easily be mistaken for *S. olivacea*, N.E. Brown.

1296. **Penaea Candolleana**, *E. L. Stephens* [Penaeaceae]; a *P. ericoide*, Endl., foliis ellipticis differt.

Fruticulus circiter 3 dm. altus, ramosus; rami in partibus inferis defoliati, cortice subrufo obtecti. *Folia* in partibus superis

conferta, erecta vel patula, basi in petiolos breves attenuata, elliptica, obtusa vel acuta, plerumque subter in medio parum sulcata, 6–8 mm. longa, 2–2·5 mm. lata, exstipulata; setulae paucae, minutae utrinque in foliorum bractearum bracteolarumque axillis. *Flores* laterales; bracteae foliis similes, persistentes; bracteolae 2, in pedicelli apice sitae, ante anthesin deciduae, ellipticae vel lanceolatae, medio coriaceae, margine membranaceae, bracteis breviores. *Perianthium* anguste cylindrico-ovatum, 7–8 mm. longum; tubus limbo bis longior; lobi deltoidei, acuminati; stylus lobis 4 planis oblongis cruciformibus superatus, sub quoque lobo angulatus.

South Africa. Without locality, old collector in Herb. De Candolle. Coast Region: Stellenbosch, "procumbent on the rocks," *Niven in Herb. Mus. Brit.*

1297. **Loranthus** (**Constrictiflori**) **crispatulus**, *Sprague* [Loranthaceae-Eulorantheae]; affinis *L. tschintschochensi*, Engl., et *L. Buvumae*, Rendle, ab illo calyce ascendente, ab hoc foliis basi rotundatis, ab ambobus nervis lateralibus foliorum utrinque 2 recedit.

Rami adulti griseo-brunnei, subtiliter lenticellati, glabri, 4–6 mm. diametro; ramuli crassiusculi, subtiliter striati, minute dense puberuli, circiter 4 mm. diametro 23 cm. infra apicem; internodia 2·5–6·3 cm. longa. *Folia* opposita, ovata vel ovato-lanceolata, acute acuminata, basi rotundata vel seniora subcordata, rarius obtusa, 6·5–11·5 cm. longa, 3·2–7 cm. lata, coriacea, interdum tenuiter, glabra, margine crispatula; nervi laterales utrinque 2, obliquissimi, superiores costae subparalleli, supra leviter elevati, subtus prominentes, venulis vix visis; petioli 4–7 mm. longi, minute puberuli vel glabri. *Umbellae* axillares, solitariae, vel in ramis senioribus fasciculatae; pedunculus 3·7–4 mm. longus, crassus, basi incrassatus, minute dense puberulus, praesertim apice, cavis pedicellorum patelliformibus 1·3–1·5 mm. diametro apicem parvum planum vel concavum pedunculi circumdantibus; pedicelli 2 mm. longi, ut bractea minute dense puberuli; bractea breviter ovato-cupularis, obtusa, margine dorsali 1–1·3 mm. longo, margine ventrali 0·5 mm. longo. *Torus* calycecum campanulatus ore lato, 3·7 mm. longus, minute puberulus, dimidio inferiore quam superiore multo angustiore; torus 1·8 mm. longus, 1·3 mm. diametro. *Calyx* suberecto-ascendens, 1·8 mm. longus, subtruncatus margine breviter irregulariter fisso. *Corolla* in alabastro circiter 4·5 cm. longa, depresso-truncata, extra minute pilosa; tubus circiter 2 cm. deorsum unilateraliter fissus, ampulla basali oblongo-ellipsoidea, 4·5–5 mm. longa; lobi reflexi, spathulati, 8 mm. longi, superne 1·8 mm. lati, apice sub angulo recto inflexi, angulo exteriore in labrum ascendens dorsale producti. *Filamenta* circiter 0·25 mm. infra basin corollae loborum inserta, involuta, sursum sensim angustata, 5 mm. longa, dente ventrali 0·5–0·7 mm. longo; antherae anguste oblongae, 2·3 mm. longae. *Discus* 0·5 mm. altus, vix lobatus. *Stylus* superne metuliformis, parte incrassata circiter 7 mm. longa, collo 1·8 mm. longo; stigma ellipsoideum, 0·9 mm. longum, subtruncatum.

Tropical Africa. Congo State: Nouvelle Anvers, parasitic on *Coffea liberica*, Hiern, *De Giorgi*, 5, 6.

Described from specimens in the Brussels Herbarium.

1298. **Loranthus (Constrictiflori) findens,** *Sprague* [Loranthaceae-Eulorantheae] ; affinis *L. constrictifloro*, Engl., a quo foliorum marginibus crispatis nervisque lateralibus minus obliquis, corollae lobis profunde sejungentibus differt.

Ramuli rubello-brunnei, subtiliter dense lenticellati, glabri. *Folia* ovato-lanceolata, breviter obtuse acuminata, basi rotundata, 6–8 cm. longa, 2·5–3·7 cm. lata, coriacea, glabra, utrinque opaca, margine crispata ; nervi indistinctissimi, laterales satis obliqui, venis vix visis ; petioli circiter 6 mm. longi. *Umbellae* axillares, solitariae, 4-florae, glabrae ; pedunculus crassus, 2–2·5 mm. diametro, area apicali plana parva cavis pedicellorum patelliformibus 1·5 mm. diametro circumdata ; pedicelli crassi, 1·3 mm. longi ; bractea breviter oblique cupularis, margine dorsali 1·3 mm. longo, margine ventrali 0·8 mm. longo. *Torus* calycecum anguste campanulatus, 3 mm. longus ; torus 1·5 mm. longus, sursum sensim ampliatus, apice 1·5 mm. diametro. *Calyx* ascendens, 1·5 mm. longus, truncatus, irregulariter fissus, intus juxta basin annulo paullo incrassato. *Corolla* in alabastro 4–5 cm. longa, glabra ; tubus omnes inter lobos usque ad 0·8–1·6 cm. infra insertionem staminum findens, ampulla basali obovoidea 4·5 mm. longa ; lobi reflexi, lanceolato-spathulati, parte superiore dilatata lanceolata acuta 4 mm. longa, 1·3 mm. lata. *Filamenta* circiter 9 mm. infra apices loborum inserta, inflexa, sursum sensim angustata, 5–5·5 mm. longa, dente ventrali 0·5 mm. longo ; antherae oblongae, 1·8 mm. longae. *Discus* pentagonus, vix lobatus, 0·3 mm. altus. *Stylus* superne metuliformis, parte incrassata 5 mm. longa, collo 2 mm. longo, dimidio superiore multo crassiore quam dimidio inferiore ; stigma oblongo-ellipsoideum, 1·2 mm. longum.

Tropical Africa. Congo State : Lukolela, Dec., 1900 (collector not known).

Described from a specimen in the Brussels Herbarium.

1299. **Jatropha Brockmanii,** *Hutchinson* [Euphorbiaceae-Jatropheae] ; affinis *J. lobatae*, Muell.-Arg., sed foliis confertis fere ad basin tripartitis, segmentis oblongo-lanceolatis, stipulis multo longioribus confertis differt.

Rami crassi, carnosi, cortice pallide flavo obtecti. *Folia* conferta, fere ad basin tripartita, basi subcuneata, circiter 4 cm. longa et lata, rigide membranacea, utrinque glabra, segmentis oblongo-lanceolatis grosse dentatis dentibus acutis glanduloso-apiculatis, nervis lateralibus utrinque 8 distinctis ; petioli vix 1·5 cm. longi, glabri ; stipulae confertae, in segmenta 1·3–2 cm. longa filiformia glabra glanduloso-apiculata dissectae. *Cymae* pedunculatae, paucifloraे ; pedunculi 4 cm. longi, glabri ; bracteae ovato-lanceolatae, pectinatim glanduloso-dissectae, 4 mm. longae. *Flores* ♂ : *Sepala* oblongo-obovata, acuta, 2·5 mm. longa, superne glanduloso-dentata, glabra. *Petala* obovata, basi libera, integra, glabra, quam sepala paullo longiora. *Disci glandulae* rotundatae, laeves, carnosae. *Stamina* 8 ; filamenta inferne connata. *Flores* ♀ pedicellati. *Sepala* ut in floribus ♂, majora. *Petala* non visa. *Discus* patelliformis, undulate lobatus. *Ovarium* ignotum.

Tropical Africa. Somaliland : Golis Range, *Drake-Brockman*, 131.

The specimen is somewhat incomplete, but I have no doubt as to its being undescribed after comparison with all Pax's new species kindly lent to Kew by Prof. Engler.

1300. **Jatropha confusa**, *Hutchinson* [Euphorbiaceae-Jatropheae]; affinis *J. pseudoglanduliferae*, Pax, foliis ad medium lobatis, sepalis ♂ pectinatim dentatis valde distincta.

Frutex ad 2 m. altus, ramosus, carnosus; rami crassi, teretes, glabri. *Folia* ambitu suborbicularia, basi cordata, 6–10 cm. longa, 9–14 cm. lata, circiter ad medium digitatim 5-lobata, rigide subchartacea, acute glanduloso-serrulata, glabra nervis supra parce puberulis exceptis; lobi oblongo-ovati, acuti, 3–4·5 cm. lati, nervis lateralibus utrinque 6–8 distinctis patulis prope marginem ramosis, venis subtus distinctis; petioli 3–10 cm. longi, glabri, eglandulosi; stipulae in segmenta linearia 10 dissectae, circiter 4 mm. longae, glanduloso-apiculatae, glabrae. *Cymae* longe pedunculatae, subthyrsoideae, circiter 4 cm. latae; pedunculi robusti, 10 cm. longi, glabri; bracteae anguste lanceolatae, acutae, ad 1 cm. longae, glanduloso-pectinatae, glabrae. *Flores* ♂: *Sepala* ovata, subacuta, 5 mm. longa, 2·5 mm. lata, glabra, pectinatim dentata. *Petala* obovata, apice rotundata, vix 1 cm. longa, 5 mm. lata, integra, glabra. *Disci glandulae* magnae, ovatae, carnosae, 2 mm. longae. *Stamina* 8; filamenta inferne connata; antherae magnae, oblongae, 3·5 mm. longae. *Flores* ♀: *Sepala* quam ♂ multo majora. *Petala* obovato-elliptica, integra, 1·3 cm. longa, 7 mm. lata, multistriata. *Discus* cupularis, undulate lobatus, glaber. *Ovarium* glabrum; styli breves, bilobi, stigmatibus crassioribus. *J. lobata*, var. *senegalensis*, Muell.-Arg. in DC. Prodr., vol. xv., part ii., p. 1086, partim. *J. lobata*, subsp. *senegalensis*, Pax in Engler, Pflanzenreich, Euphorb.—Jatroph., p. 33, partim. *J. glauca*, var. *senegalensis*, Hiern in Cat. Afr. Pl. Welw. i. 969.

Tropical Africa. Angola: Mossamedes; by fences around cotton plantations, half wild, and in thickets at the edges of mandioc fields near the mouth of the River Bero, *Welwitsch*, 299.

This plant was regarded as a variety (*senegalensis*) of *J. lobata*, Muell.-Arg. (*Croton lobatus*, Forsk.), by Mueller in De Candolle's Prodromus, and later by Hiern and by Pax, though it appears to me quite distinct and easily separated from that species. Mueller associated with it specimens collected by *Lelièvre* and by *Perrottet* (No. 733) in Senegambia, and these are identical with *J. Chevalieri*, Beille, described from specimens collected by Chevalier in the same region. Beille, however, did not recognise the identity of his plant with Mueller's var. *senegalensis*.

J. lobata, Muell.-Arg. (typical), is confined to the extreme eastern Sudan and Abyssinia, extending into Arabia; whilst *J. Cheralieri*, Beille, inhabits Senegambia, and the species here described has so far been found only in Angola.

L.—OSTRYOCARPUS AND A NEW ALLIED GENUS OSTRYODERRIS.

S. T. Dunn.

One of the earliest botanical collections made in Tropical West Africa was that conducted by Theodor Vogel during the expedition organised by the African Civilisation Society in 1841, and usually known as the Niger Expedition. Sierra Leone, the Niger River and the Island of Fernando Po were in turn visited and explored and in each of these places specimens were gathered of the remarkable leguminous shrub on which the genus *Ostryocarpus* was founded. The botanical collections and information amassed by Vogel were entrusted on the return of the expedition to the Director of Kew, Sir William Hooker, for description and publication and among the other botanists who eventually took part in the work was his son, now Sir Joseph Hooker. The leguminous plant referred to above thus came into the hands of that great botanist at the beginning of his long and distinguished career and was at once recognised by him as the type of a new genus allied to *Lonchocarpus* from which it was distinguished by its diadelphous stamens and peculiar shell-like pod. It is from the latter characteristic that the name is presumably derived (ὄστρεον a shell).

Two other West African shrubs possess, like it, glabrous exstipellate leaflets, short-stalked flowers crowded on short special branchlets, nearly sessile broad glabrous standards, hooked wings and keel petals and a short 2–3-ovuled gynoecium surrounded at the base by a fimbriate disk which is usually adnate to the consolidated base of the calyx.

Ostryocarpus, *Hook. f.* Niger Fl. (1849) 316 ; Benth. et Hook. f. Gen. Plant. i. 548 ; Baker in Fl. Trop. Afr. ii. 240 ; Engl. et Prantl, Pflanzenfam. 3, iii. 343.

Tropical West Africa : French Congo to Senegambia.

Leaflets 5, panicle branchlets short, floriferous to base ... ... *O. riparius*
Leaflets 9—
Leaflets acute, reticulate above, flowering branchlets bare at base ... ... *O. Zenkerianus.*
Leaflets obtusely acuminate, smooth, flowering branchlets floriferous to base ... ... *O. lucidus.*

O. riparius, *Hook. f.* Niger Fl. (1849) 316.

A climbing or straggling shrub with yellowish-white flowers, widely distributed in the coastal regions of West Tropical Africa.

Tropical Africa. Senegambia : River Nunez, *Heudelot*, 81*7*. Sierra Leone : Bagru River, *Mann*, 832, and without precise locality, *Vogel*, 59, 146. Liberia : Sinoe Basin, *Whyte*, and without precise locality, *Dinklage*, 1725. Ivory Coast, *Preuss*, 1166, *Chevalier*, 17,876. Cameroons, *Winkler*, 479. Fernando Po : Gutridge Bay, *Vogel*, 107. Spanish Gaboon : River Muni, *Mann*, 1768. Gaboon : Como River, *Bates*, 484.

O. Zenkerianus, *Dunn*, nom. nov. ; *Millettia Zenkeriana*, Harms in Engl. Jahrb. xxvi. 291.

Tropical Africa. Cameroons : Sanaga, *Zenker*, 1453.

O. lucidus, *Dunn*, nom. nov.; *Derris lucida*, Welw. ex Baker in Fl. Trop. Afr. ii. 245; *Millettia breviflora*, De Wild. in Ann. Mus. Congo, sér. 5, i. 136.

This species appears to prefer wooded situations and to climb over high trees; it flowers in June.

Tropical Africa. Lower Congo: Valley of the River Djama, *Gillet*, 2845. Angola: Golungo Alto, *Welwitsch*, 1877, 1878.

In the thyrsoid nature of its inflorescence *Ostryocarpus* approaches the section of *Millettia* to which *M. macrostachya*, Dunn (*Lonchocarpus macrostachyus*, Hook. f.), belongs and which likewise possesses glabrous petals, but in other characters it is easily distinguishable, even without fruit, from that well defined group.

It will be observed from the synonomy that neither of the species here associated with Hooker's was originally referred to the genus of which he made it the type. Mention must now be made of the three species which had previously been ascribed by their authors to *Ostryocarpus*, but which differ in so many points from the three above enumerated that it is preferred to defer the consideration of their inclusion until fuller material is obtained. These are *O.? Welwitschii*, Baker in Fl. Trop. Afr. ii. 240, and *O. parvifolius*, M. Mich. in De Wild. et Th. Dur. in Ann. Mus. Congo, sér. 3, i. 71, in which the inflorescence is not thyrsoid, and *O. major*, Stapf, in Journ. Linn. Soc. xxxvii. 96, in which the leaflets are stipellate and the ovary 5–6-ovulate.

Another group comprising three species of West African shrubs with thyrsoid panicles of white flowers must be placed near *Ostryocarpus*. It is characterised by stipellate leaflets, conspicuously bracteate flowers, glabrous petals, winged pod and by the spreading, not adpressed radicle of the embryo, which distinguish it from all allied genera, though in its inflorescence it is closely associated with *Ostryocarpus* and in its pod with *Derris*. It is therefore proposed to describe it as a new genus under the name of *Ostryoderris* to indicate its connection with those two genera.

Ostryoderris, *Dunn*, gen. nov. *Derri*, Lour., affinis, sed foliolis stipellatis distincta.

Frutices scandentes vel diffusi. *Folia* alterna, imparipinnata; foliola stipellata. *Paniculae* terminales, thyrsoideae. *Flores* saepissime conspicue bracteati. *Calyx* campanulatus, 5-dentatus. *Petala* glabra; vexillum breviter unguiculatum, vix callosum; alae antice haud hamatae. *Stamina* diadelphia, vexillare solutum. *Discus* calyci adnatus. *Ovarium* pauci-ovulatum. *Legumen* indehiscens, compressum, ala utrinque marginatum, valvis inter semina cohoerentibus. *Semina* lenticularia; embryonis radicula brevis, patens, nec cotyledonibus adpressa.

Tropical West Africa.

Leaflets ferrugineous beneath	*O. impressa.*
Leaflets glabrous beneath—	
Flower bracts erect, persistent until flowering time	*O. leucobotrya.*
Flower bracts folded over the top of the buds, early deciduous	*O. gabonica.*

O. impressa, *Dunn*. *Frutex* scandens, ramulis striatis tenuiter rufis. *Folia* 4–5-juga, 20–30 cm. longa; stipulae lanceolatae,

acutae, 2·5 cm. longae, tarde deciduae ; foliola superiora lateralia longe acuminata, basi rotundata, 7–10 cm. longa, chartacea, subtus ut rachis tenuiter rufa ; venae margini propinquantes 8–11-jugae, supra impressae, subtus prominentes ; petioluli 2–3 mm. longi ; stipellae setaceae, 4–5 mm. longae. *Panicula* angusta, terminalis, ad 25 cm. longa, rachi ut ramulis calycibusque laxe rufo-sericea ; ramuli floriferi 3–4 cm. longi. *Flores* dense conferti, 1·5 cm. longi ; pedicelli 1 mm. longi ; bracteae 1·6 cm. longae, lanceolatae, acutae, tenuiter rufae. *Calyx* 5 mm. longus, dentibus latis brevibus. *Petala* glabra, albida, nigricantia ; vexillum rotundatum, basi in unguem brevissimum angustatum, 1·3 cm. longum ; alae oblongae, ad basin gradatim angustatae; carina in unguem subito contracta nec hamata. *Stamina* diadelphia. *Ovarium* velutinum, 6–7 ovulatum. *Legumen* ignotum.

Tropical Africa. Southern Nigeria : Calabar District, *Williams*, 4.

O. leucobotrya, *Dunn*. *Frutex* vel *arbor* parva, praeter inflorescentiam glabra ; cortex laevis, lenticellatus. *Folia* 4- (3- vel 5-) juga, nigricantia, 15–25 cm. longa, petiolo 5-plo longiora ; stipulae oblongo-lineares, 2·5 cm. longae, tarde deciduae ; foliola superiora lateralia ovato- vel lineari-oblonga, acuminata, caudata, apice truncata vel retusa, basi rotundata, 6–9 cm. longa, chartacea ; nervi circiter 6-jugi, infra paullo prominentes ; petioluli 2–3 mm. longi ; stipellae setaceae, 3 mm. longae. *Paniculae* angustae, terminales, 25–40 cm. longae, rachi ut ramulis calycibusque dense velutina ; ramuli floriferi 4–6 cm. longi, bracteis magnis deciduis suffulti. *Flores* dense conferti, 1·2–1·3 cm. longi ; pedicelli graciles, 2–2·5 mm. longi ; bracteae 0·9–1 cm. longae, albae, sericeae, deciduae ; bracteolae 2, minutae. *Calyx* campanulatus 3–3·5 mm. longus, dentibus brevibus latis. *Petala* glabra, albida, nigricantia ; vexillum ovatum, cuneatum, ad laminae basin paullo incrassatum ; alae carinaque basi cuneatae. *Stamina* diadelphia. *Ovarium* velutinum, 6–7-ovulatum. *Legumen* complanatum, oblongum, apice basique obtuse acutum, ala coriacea 4–5 mm. lata cinctum, 2-spermum, glabrum, flavidum.

The flowers, which are preceded by a dense panicle, white with bract-covered buds, appear in December.

Tropical Africa. Sierra Leone : in forest on the way to Lester Peak, *Scott Elliot*, 3842 ; Pangumu, *Smythe*, 62 ; rain forest, *Sierra Leone Herb.* 35. Ivory Coast : Bingerville, *Chevalier*, 17,304.

O. gabonica, *Dunn*, nom. nov.; *Andira ? gabonica*, H. Baillon in Adansonia, vi. 219 (adnot.); *Lonchocarpus ? macrostachyus*, Hook. f. in Hook. Niger Fl. 317. *Descr. addend.*

Legumen oblongum, apice obtusum, basi cordatum, complanatum, ala coriacea 7–9 mm. lata utrinque marginatum, 12–17 cm. longum, 3·5–4·5 cm. latum, 2–3-spermum. *Semina* lenticularia, rhomboidea, radicula patente in basin saccatam testae intrusa.

Tropical Africa. Southern Nigeria : Old Calabar River, *Mann*, 2244. Cameroons : Cameroon River, *Mann*, 2192. Gaboon : (type of *Andira ? gabonica*, Baill.), *Duparquet*, 32, *Klain* 321, 706, 2096.

A straggling shrub with whitish bracts covering the buds, which develop from December to February into white or pinkish flowers.

LI.—ADDITIONS TO THE WILD FAUNA AND FLORA OF THE ROYAL BOTANIC GARDENS: XII.

The last list of additions to our Wild Fauna and Flora was published in 1910 (*K.B.* 1910, pp. 79–84). Since that date a considerable number of new observations have been recorded which cover a wide range of natural objects.

Specimens belonging to certain special groups have been kindly examined by various authorities whose names are recorded under their particular subjects, but our thanks are also due to the authorities of the British Museum, to Dr. A. Günther, Prof. J. W. H. Trail, Mr. R. S. Bagnall, and to the Rev. F. D. Morice and others for much kind help in the identification of specimens. To the members of the garden staff our thanks are also due, as the collection of the specimens herein recorded is largely due to their enthusiastic co-operation.

AVES.

Passeres.

Cotyle riparia, *L.* "Sand Martin." Seen flying over the pond with House Martins, October 7, 1911. Sand martins often occur in spring and autumn in localities where they are not found in the summer; such individuals are probably migrants to or from more northern districts.

REPTILIA.

Lacertilia.

Lacerta agilis, *L.* "Lizard." In rock garden. Coll. J. Sharps.

A species not uncommon in the New Forest, but very scarce and probably introduced in these parts of the country.

MOLLUSCA.

Hyalinia lucida, *Drap.* In fern houses. Coll. E. W. Morse. Occurs in various places throughout the British Isles.

ARTHROPODA.

Malacostraca.

Porcellio laevis, *Brandt.* Propagating pits. Coll. J. W. Judd.

Armadillidium depressum, *Brandt.* Propagating pits. Coll. J. Lambourne.

ANTENNATA.

Myriapoda.

Chilopoda (Centipedes).

Rhysida longipes, *Newp.* In Wardian case from Peru. Coll. H. Downer. A species widely distributed in tropical countries.

Diplopoda (Millipedes).

Glomeris marginata, *Vitt.* In fern houses. Coll. T. G. Bullock.

INSECTA.

Thysanura (Bristle-tails).

Campodea staphylinus, *Woodw.* Orchid houses. Coll. J. James,

Lepisma saccharina, *Linn.* "Silver-fish." Tropical fern house. Coll. H. Green. One of the most primitive of insects.

Thermitobia domestica, *Pack.* Coll. H. Green. Previously recorded from the Royal Botanic Gardens, Edinburgh.

Collembola (Spring-tails).

Orchesella villosa, *Geof.* Fern houses. Coll. J. D. Snowden.

Tomocerus plumbeus, *Linn.* Orchid houses. Coll. J. James.

Diptera.

Bibio marci, *L.* ♀. Propagating pits. Coll. H. Downer.

Chironomus? plumosus, *L.* ♂. Propagating pits. Coll. A. Aubrey.

Culex pipiens, *L.* ♀. Herbaceous grounds. Coll. W. Irving. One of the blood-sucking species of gnats or mosquitos, widely distributed in and beyond Europe.

Theobaldia annulata, *Schrank.* ♀. Said to suck fluid of plants, but sometimes also sucks blood, inflicting a severe bite.

Syrphus ribesii, *L.* In office.

Eristalis tenax, *L.* Coll. J. Mingay. Larva of the Drone fly, found in wood. The larvae are known as Rat-tailed maggots.

Myiatropa florea, *L.* In fern houses. Coll. T. G. Bullock. Fairly common, larvae found in hollows in stems of beech trees.

COLEOPTERA.

W. E. Sharp.

(British species.)

Hydradephaga.

Agabus affinis, *Payk.* Coll. J. James. A water beetle rare in Britain, of discontinuous but generally northern distribution. It occurs at Esher, and has probably flown thence to Kew.

Brachelytra.

Tachyporus solutus, *Er.* Coll. H. Downer. Generally common in moss, &c. in Britain.

Philonthus fimitarius, *Gr.* Coll. H. Green. A very common and widely distributed species in refuse of various kinds.

Trogophloeus pusillus, *Gr.* Coll. H. St. J. Donisthorpe. This small beetle has probably flown to the propagating pits, where it was found, from the bank of the river, its natural habitat being the muddy margins of ponds or rivers.

Clavicornia.

Choleva tristis, *Panz.* Coll. J. W. Judd. A common speci e The larvae feed on the dried remains of carrion, skin, bones, &c.

Lamellicornia.

Geotrupes spiniger, *Marsh.* Coll. J. D. Snowden. Common everywhere in the dung of herbivorous animals and familiar to many non-entomologists as the beetle who "wheels his droning flight" in country lanes on summer evenings.

Melolontha vulgaris, *F.* Coll. H. Green. The common Cockchafer. To find this insect in the imaginal state in March is quite abnormal and due probably to the forcing effect of the temperature of the fern house. The larvae feed underground in the roots of various plants.

Cetonia aurata, *L.* Coll. B. Alloway. The common and beautiful "rose chafer." The larvae feed in the decayed wood of standing trees and the beetle is often found in roses in gardens.

Serricornia.

Niptus crenatus, *F.* Coll. H. Downer. Common in shops, warehouses, &c., where it feeds on decaying grain and seeds.

Lyctus brunneus, *Steph.* In Timber Museum. Coll. W. Dallimore. Bores into wood, in this case of *Terminalia*.

Rhyncophora.

Otiorrhynchus sulcatus, *F.* Coll. R. A. Dummer. Generally common and often injurious to Delphiniums and Chrysanthemums in gardens.

(*Exotic species.*)

Bruchus chinensis, *L.* Coll. J. H. Holland.
In seeds of *Phaseolus lunatus* from Manchuria.

Several species of this large genus have now been found in the houses at Kew, imported in seeds. The larvae bore into and devour seeds of various plants—principally leguminous—and are carried by commerce about the world. They are exceedingly destructive, and whole cargoes of beans and peas are sometimes ruined by their depredations. Some of these Kew specimens from the interior of Africa still await identification or possible description.

HYMENOPTERA.

Formicidae (Ants).

H. St. J. Donisthorpe.

Since the last list of ants found at Kew was published (*K.B.* 1909, p. 250), we have had quite a number of additions, some of them being of considerable interest. Before giving the new list it is worth while to make a few remarks on some of the older or longer established species.

Prenolepis braueri, sub. sp. **donisthorpei,** *Forel*, is as abundant as ever in the Fern House, and I captured a ♂ for the first time last year. This form has been long established at Kew ; I find I took specimens of it as far back as 1896.

Technomyrmex albipes, *Smith*, the most abundant species at Kew, occurs as usual in numbers in the Palm House where the winged and ergatoid ♂♂ were also abundant. One ♂ with very short wings is of considerable interest.

Wasmannia auro-punctata, *Roger*. A number of young of a coccid of the genus *Dactylopius* was found in a nest of this species, and the little spider *Diblemma donisthorpei*, Cambr., frequently occurred in company with this little ant.

The following are all new species to the Kew published lists.

Ponerinae.

Ectatomma regularis, *Mayr*. In propagating pits. Coll. H Downer. Two ☿☿. Probably from Mexico.

Ponera opaciceps, *Mayr*. In propagating pits. Coll. J. Sparrow. Two ☿☿. A species from Central America.

Myrmicinae.

Monomorium destructor, *Jerdon*. Coll. C. P. Raffill. Many specimens (☿☿) living and dead were taken on a plant from Calcutta. The ☿☿ in this pretty little species vary considerably in size. It is a cosmopolitan ant.

Pheidole gertrudae, *Forel*. In propagating pits. Coll. H. Downer. ♀ winged, ☿☿ minor and major (𝔍𝔍). This species comes from Brazil—Rio de Janeiro, &c.

Pheidologeton diversus, *Jerdon*. In fern pits. Coll. J. Christie. Deälated ♀ and ☿☿ minor. The ♀ which is enormous in size, especially in comparison with the very small ☿☿, was found in the soil in the bottom of a pot. The species occurs in India, Java, &c.

Tetramorium guineense, *Fab*. Mr. Crawley and I found ♀♀ and ☿☿ in some numbers of this ant in one of the small houses near the Orchid Houses last December. It is a cosmopolitan species. It was first found in Britain in 1866.

Tetramorium magitae, *Forel*. Coll. C. P. Raffill. ☿☿ taken on a plant from Java. This species has recently been described by Prof. Forel from Ceylon.

Dolichoderinae.

Tapinoma melanocephalum, *F*. ☿☿ of this very small ant were taken by C. P. Raffill. It is a cosmopolitan species of tropical origin. Although it has not been published in the Kew lists heretofore, it was recorded by Billups on a palm in the Palm House in 1886. (Trans. Ent. Soc. Lond. 1887, p. xxvii.)

Camponotinae.

Prenolepis vividula, *Nyl.*, sub. sp. **antillana,** *Forel.* I have found ☿ ☿ of this sub-species for some years now in the Palm House. It has been recorded incorrectly as the sub-sp *donisthorpei* of *P. braueri* which is only found in the Fern House. It may be known from the latter by its somewhat larger size and its partly red colour, whereas the former is all black.

Camponotus abdominalis, *Roger*, sub-sp. **stercorarius,** *Fab.* A ☿ of this large ant was taken by F. G. Cousins on a clump of imported *Laelia Gouldiana* in the Orchid House. I have had a ♀ and several ☿ ☿ of this race sent to me alive, taken on bananas at Clifton.

Lasius niger, *L.*, sub-sp. **latioides,** *Emery*, ♀. In Orchid House. Coll. C. H. Harris.

I must again thank Professor Forel for kindly naming some of the above species for me.

Apidae (Bees).

Andrena fulva, *Schrank.* The common species usually nesting on lawns, &c., and throwing up little pyramids of sand.

Anthophora filipes, *F.*

Bombus terrestris, *F.*

Bombus hortorum, *Linn.*

Vespidae (Wasps).

Vespa vulgaris, *Linn.* Coll. W. Dallimore. The common wasp, found nesting in a tree in A.; usually builds underground.

Odynerus callosus, *Thoms.* In fern pits. Coll. T. G. Bullock. A solitary wasp which stores its cells with caterpillars.

O. parietum, *Linn.* In temperate house pits. Coll. W. Davies. A solitary wasp.

Tenthredinidae (Sawflies).

Nematus lacteus, *Thomson.* Coll. W. Dallimore. Feeds on willows and the larvae congregate upon the leaves on which they feed. The common gall-forming sawfly of the willow is *N. gallicola.*

Ichneumonidae (Ichneumon-flies).

Ichneumon stramentarius, *Gr.* Coll. H. Green. Found dormant in peat in winter.

I. confusorius, *Grav.* Coll. C. P. Raffill. A species parasitic chiefly on the *Noctuae.*

Chrysididae (Ruby-wasps).

Ellampus auratus, *Linn.* Coll. M. Free. Found throughout all Europe, and the most abundant of the family.

ARACHNIDA.

Rev. O. Pickard-Cambridge, M.A., F.R.S., &c.

Since the publication of my last communication (*K.B.* 1909, pp. 246–250), additions to the list of Arachnids are but few, one only (*Bathyphantes explicata*, sp. n.) being, presumably, indigenous. Among the most frequent of the *Araneidea* sent to me have been *Hasarius adansonii*, Sav., and *Theridion tepidariorum*, C. L. Koch. The former is a conspicuous spider, very active and no doubt easily seen by the employès in the gardens, by whom the collections have chiefly been made, and the latter is found in every plant house almost in the kingdom, in corners and windows, and now and then in the open grounds among plants, &c. Both species are cosmopolitan, and the latter may almost be considered a British spider.

ARANEIDAE.

British species.

Theridiidae.

Bathyphantes explicata, *Cambr.*, sp. n. Coll. in 1898.

Adult male length rather less than 1 line.

Cephalothorax oval, slightly rounded before, considerably longer than broad, lateral impressions at caput very slight; the profile line is distinctly hollow from the eyes to the beginning of the hinder slope.

Eyes of hinder row in a very nearly straight line; the two centrals largest and rather nearer together than each is to the hind-lateral eye on its side, and the interval between the hind-centrals is rather less, or not more, than half a diameter. The fore-centrals are smallest, seated on a strong prominence, and with the hind-centrals form an oblong whose fore-extremity is shortest. Each lateral pair is also seated on a tubercular prominence. The height of the clypeus is half, or a little less than half, of the facial space and projects a little at its lower margin. The colour of the cephalothorax is pale dull yellowish-brown; the normal lines and indentations are indicated by darker brown.

The *falces* are moderate in length and strength, of normal form and similar in colour to the cephalothorax.

Legs, 4, 1, 2, 3; 4 and 1 nearly equal and of moderate length. A few slender spines on the tibiæ (none on the metatarsi), of the 1st and 2nd pairs; colour similar to, or perhaps, rather paler than the cephalothorax.

Palpi like the legs in colour; the cubital and radial joints short; the former shortest, and the latter much the longest, and produced in front on the upper side, both at its fore-extremity as well as underneath, and at each fore-corner is a prominent point or projection, the outer one being the most prominent, and truncate at its extremity, the inner one, when looked at in profile, curved and pointed. The cubital joint has a single tapering slightly sinuous, slender bristly hair projecting forwards. The digital joint is rather

large, slightly prominent near its base ; the palpal organs are complex, and require drawings to give a correct idea of their structure.

Abdomen oval, and of normal form ; its colour is a uniform blackish-brown, and it is thickly furnished with short fine hairs.

I have lately found the specimen above described among some other small spiders received from Kew in 1898 but overlooked ; it differs in the form of the radial joint of the palpus, from any other species of the genus known to me, but there is nothing in either the form or structure of this spider to make me doubt its being an indigenous species, and not to have been imported from any foreign parts. I hope to give some figures in a future paper in Proc. Dors. Nat. Hist. and Antiq. Field Club.

(*Exotic Species.*)

THERAPHOSIDAE.

Bolostromus suspectus, *Cambr.*, sp. n. In soil from Uganda. Coll. H. Green.

Female, immature, length $3\frac{1}{2}$ lines.

Cephalothorax narrow oblong-oval, truncate in front, lateral impressions at caput very slight, the profile at caput gently but not greatly elevated above the thorax in a slightly convex curve. Colour dull pale yellowish-brown, the marginal line dark brown, and the normal indentations are marked with indistinct brownish lines. The thoracic indentation is rounded and its convexity directed backwards.

The *falces* are moderate in length and strength, and slightly projecting forwards, with several strongish tooth-like spines at their fore extremity on the upper side. The fangs are directed obliquely inwards.

Legs moderately long and strong, apparently 1,4,2,3, of a pale dull yellowish colour, the first pair suffused with blackish-brown. The spines beneath the tarsi and metatarsi of the first and second pairs are long but not very strong ; those on the third and fourth pairs are stronger. Beneath the tarsi of the first pair the spines are in two longitudual rows.

Maxillae short, strong, and obliquely truncate. *Labium* longer than wide, its sides sub-parallel, and rather narrowest at the apex, which is slightly hollow-truncate ; these parts are of a pale yellow-brown hue. *Sternum* oval, longer than broad and truncate at its fore-extremity ; its colour is a pale whitish-yellow, and it is covered thickly with bristly hairs.

Abdomen elongate-oval, of a purplish-brown colour above, and dull pale yellowish beneath. The spinners are four in number ; those of the superior pair 3-jointed, of moderate length ; those of the inferior pair close in front of the others.

The *eyes* are unequal in size, in two sub-quadrate groups of four each, or in two transverse lines near together. The outer eyes of the anterior row are the largest, and much larger than the two intermediate ones, these last being also rather larger than the two intermediate eyes of the posterior row. Each lateral pair is seated on a slight tubercular eminence.

Three examples were found among soil received from Uganda. The immaturity of these specimens makes it impossible to speak with certainty as to their species. I have, however, thought it worth while to name it provisionally, and to describe it shortly, so as to assist in the identification of any other examples that may occur in the gardens, and I hope to give some figures of it in my next report in Proc. Dors. Nat. Hist. and Antiq. Field Club.

The distribution of the genus *Bolostromus*, Simon, as at present known, is South and East Africa and South America.

Dysderidae.

? Orchestina dubia, *Cambr.*, sp. n. Coll. H. St. J. Donisthorpe. Female adult, length ½ lin.

Cephalothorax longer than broad ; of an oval form, blunt-pointed at its anterior extremity ; the lateral impressions at the caput are very slight, clypeus prominent ; a slight impression in profile between the caput and thoracic junction ; colour brownish-yellow, strongly marked on the margins, and along the normal indentations with converging linear markings of black-brown, and a large irregular triangular patch of the same colour close behind the caput.

The eyes are six in number, rather large, about equal in size, somewhat in the form of a semi-circle, the convexity directed forwards. The four anterior eyes form a nearly straight transverse line, and are contiguous to each other ; the two centrals oval ; behind each of the lateral eyes of this line is another eye on a tubercle, contiguous, and apparently the largest of the six. The eyes of the two lateral pairs are white, those of the central pair of a dark smoky hue.

The *falces* are tolerably strong, straight, conical. *Maxillae* rather strong, tapering, and strongly inclined over the *labium*, which appeared to be broader than long and pointed at its apex.

Sternum round-oval, broader than long, the hinder part slightly produced, and truncate. This part, as also the maxillae and labium, are yellow-brown suffused with black-brown.

Legs.—These were all wanting, excepting one of the fourth pair, which was slender, of moderate length and of a brownish-yellow colour.

The *palpi* appeared to have no terminal claw, and the cubital is longer than the radial joint.

The *abdomen* is of large size, of a short-oval form, very convex above, and broadest behind ; its colour is a dull brown, the underside darker. The form of the epigyne appeared to be a simple transverse cleft. The additional spiracular openings could not be satisfactorily seen.

I have placed this spider provisionally in the genus *Orchestina*, Simon, from which however it appears to differ in some of its characters, though perhaps not generically. A single example only was received, and that one much mutilated. A perfect specimen, and especially one of the male sex, would no doubt make its position more certain.

There was no clue as to whence it may have come to the Royal Botanic Gardens, but it is no doubt an exotic form.

Drassidae.

Corinna praestans, *Cambr.*—Proc. Dors. Nat. Hist. and Antiq. Field Club. 1911. Vol. xxxii, p. 37, pl. A., figs. 1–5.

In Propagating pits. Coll. J. Sparrow and H. T. Mason.

This is a fine and distinct species; received from Kew in July, 1910, and November, 1910, and described and figured (l.c. supra) as new to science. It is, no doubt, an imported spider, but there was no clue as to whence it may have come. The genus has a very wide distribution in exotic regions.

Phalangidea.

I have received from Kew, on various occasions, examples of one, if not two, exotic Phalangids, which however I have not yet been able to identify satisfactorily. They are still under examination.

ACARIDEA.

Gamasidae.

Uropoda obscura, *Koch.* In propagating pits. Coll. J. Scott. Found in tubers of *Raphionacme utilis* from Angola.

ANNELIDA.

Oligochaeta.

Rev. Hilderic Friend.

Since my last list was published (*K.B.* 1910, pp. 79–82), I have been able to add somewhat to our knowledge of the Annelids of Kew. I have, as in former years, had the kind assistance of the staff, and aided by a Government grant, have been able also personally to visit the Gardens and explore the rubbish heaps, loam, lake and ponds. It may be mentioned that on June 8th, 1910, Mr. D. Hillard collected a hair-worm, usually known as *Gordius aquaticus*. The British species of these parasites have not yet been worked out, but I have much material on hand which will receive attention in due course.

My records are chronological.

Allolobophora caliginosa, *Savigny.* Propagating pits. Coll. H. Downer.

The consignment also contained a worm which proved to be a new species, and an interesting addition to science, viz.:—

Aporrectodea similis, *Friend.* Propagating pits. Coll. H. Downer. This worm is about 7 cm. in alcohol, and has a total of 180 segments, of which 5 to 8 are the largest. It exudes very little mucus or turbid fluid, the male pores on segment 15 are not on prominent papillae, the girdle extends from 28 to 35, and the tubercula pubertatis are on the alternate segments 30, 32, 34.

Trigaster minima, *Friend.*

Fridericia peruviana, *Friend.*

Coll. H. Downer. In a Wardian case from Peru. The earth received was kept for some time under examination, with the result that these two additions were made to our list. They appear also to be new to science, and a full description of these new species will appear in suitable publications as occasion serves.

At the end of August, 1911, I visited the Gardens. The intensely dry summer made it difficult to obtain larger forms, but I was able to discover one or two new species of earthworm, and confirm some of the earlier records. The most interesting point lay in the re-discovery of the new *Aporrectodea*. I also found a new form of *Eisenia rosea* which may prove, when further material comes to hand, to be entitled to rank as a new species. My list contains the following unrecorded species.—

Eisenia rosea, *Savigny*. Type and var. **Macedonica,** *Rosa*, *A. alpestris*, Bretscher.

Allolobophora icterica, *Savigny*.

Octolasium cyaneum, *Savigny*.

The loam and vegetable mould was very dry, but I was fortunately able here to obtain some valuable material. In the loam I found four species of Enchytraeids, one of which seems to me to be new to science, while one has never before been recorded for England, though it has been found in Ireland. One is also important on account of its association with the sickness of asters and other plants.

Achaeta bohemica, *Vejdovsky*. The first English record.

Enchytraeus argenteus, *Mich.*, *E. parvulus*, Friend. The aster worm.

Fridericia bisetosa, *Levinsen*.

Fridericia pulchra, *Friend*. New to science.

The lily ponds and lake were carefully examined, and material was brought from the Lily house. Unfortunately some of this material became putrid, and I was unable to identify certain species of fresh-water worms which it contained. I was able, however, to determine the species of *Limnodrilus* formerly reported, and to add the following to the list.—

Tubifex tubifex, *Müller*.

Limnodrilus hoffmeisteri, *Clap*.

Limnodrilus udekemianus, *Clap*.

Stylodrilus vejdovskyi, *Benham*.

Limnodrilus aurantiacus, *Friend*.

The latter is a very small *Limnodrilus* new to Britain, and to science. A full diagnosis will appear elsewhere.

Limnodrilus papillosus, *Friend*, also new to science, was found.

Dero obtusa, *D'Udek*.

Paranais naidina, *Bretscher*. New to Britain.

FLORA.

Rosaceae.

Rubus Idaeus, *L.* In an enumeration of the Rubi growing indigenously at Kew, it was remarked (*K. B.*, 1909, p. 370), that a few clumps of *Rubus Idaeus*. L., recorded as growing in the Queen's Cottage grounds by the late Mr. G. Nicholson, "now seem to have disappeared ; at all events we could not find any." A large clump of it has since been pointed out to me by Mr. C. P. Raffill, which leaves only *R. macrophyllus*, Weihe & Nees, unaccounted for, and this may well be due to a change of name in such a critical group.

R. A. R.

Gramineae.

Cynodon Dactylon, *Pers.* Occurs abundantly in the turf to the west of the new range.

Selaginellaceae.

Selaginella denticulata, *Link.* Coll. Sir A. H. Church. Growing by a clump of *Saxifraga caespitosa* over rocks in Rock garden.

ALGAE.

Cyanophyceae.

Aphanizomenon Flos-aquae, *Ralfs.* At the end of August, 1911, the water of the pond by the Museums was noticed to have a peculiar greenish hue and to be opaque. This appearance was found to be due to the presence of innumerable spindle-shaped blue-green bodies floating and suspended in the water, the spindles being as much as $\frac{1}{4}$–$\frac{1}{2}$ in. long. The spindle-shaped bodies are formed of bundles of filaments of *Aphanizomenon Flos-aquae*, a species not previously recorded from Kew. In other years this pond has presented a similar appearance to that described above, but due to another "blue-green" alga *Clathrocystis aeruginosa*, Henfrey (see *K. B.* Add. Series, v, p. 208). In July, 1908, the water of the pond was pea-green in colour owing to the dense mass of this alga, and it was also seen in quantity in 1909 and 1910. During the present year, however, it has not been noticed, and the *Aphanizomenon* appears to have taken its place.

The sudden appearance of these algae is known in some parts as "the breaking of the meres," and an interesting note on the subject was published by W. Phillips in Grevillea, vol. ix (1880–81), pp. 4–5, with plate. The alga mentioned in this note is *Anabaena circinalis*, Rabh. An allied species *Anabaena Flos-aquae*, Bréb., is known at Kew (see *K. B.*, l.c., p. 210), and sometimes occurs in considerable abundance.

Microcoleus paludosus, *Gomont*, common at the sides of the paths near main entrance in spring. *A. D. C.*

Lyngbya perelegans, *Lemm.* On submerged stones in stream in Rock garden. *L. A. B.*

FUNGI: FOURTH SERIES.

G. Massee.

Since the publication of the last list in *K. B.*, 1909, pp. 373–376, the following additional species have been recorded :—

Agaricaceae.

Pholiota blattaria, *Fr.* Q.

Naucoria horizontalis, *Bull.* On twig. Q.

Coprinus fimetarius, var. **macrorhizus,** *Fr.* On horse-dung. *E. M. W.*

Tremellineae.

Tremella viscosa, *B.* On rotton wood. Q. *E. M. W.*

Pyrenomycetes.

Cordyceps entomorrhiza, *Fr.* Coll. J. W. Judd. On larva of *Ocypus olens*, in soil ; Temperate House pits.

Cordyceps entomorrhiza.

Nectria sanguinea, *Fr.* On dead branches. Q. *E. M. W.*

Hypomyces aureo-nitens, *Tul.* On old *Stereum hirsutum.* Q.

Dothidea genistae, *Wint.* On *Genista tinctoria.*

Cucurbitaria Spartii, *De Not.* On *Ulex europaea.* A.

Ophiobolus porphyrogonus, *Sacc.* Forming dull reddish stains on dead nettle stems. Q. *E. M. W.*

Discomycetes.

Helotium calyculus, *B.* On Horse-chestnut husks.
Scleroderris livida, *Mass.* On Redwood twigs.
Onygena equina, *Pers.* On an old sock.
Onygena corvina, *A. & S.* On skeleton of some bird. Q.

Deuteromycetes.

Discosia Artocreas, *Fr.* On dead herbaceous stems.
Libertella alba, *Lamb.* On *Genista tinctoria*, var. *elatior*. A.
Rhinotrichum lanosum, *Cooke.* Forming pale ochraceous woolly tufts on a damp plaster wall. *E. M. W.*
Periconia byssoides, *Pers.* On dead stems of *Urtica*. Q. *C. O. F.*
Stachylidium cyclosporum, *Grove.* On rotten wood. Q. *E. M. W.*
Dendryphium comosum, *Wallr.* On dead stems of *Urtica*. Q. *E. M. W.*
Sporodesmium chartarum, *B. & C.* On damp plaster wall. *E. M. W.*
Dictyosporium elegans, *Corda.* On dead palm leaf. Q. *E. M. W.*
Volutella nivea, *Sacc.* On an old *Scleroderma vulgare*. Q.

LII.—MISCELLANEOUS NOTES.

Mr. C. O. Farquharson, B.Sc., of the University of Aberdeen, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Mycologist in Southern Nigeria.

Pencil Cedar.—In a recent letter to the Commissioner of Agriculture for the West Indies Mr. J. C. Moore, Agricultural Superintendent for St. Lucia, reports the discovery of a juniper from the Petit Piton in that island. Some 14 years ago he had been informed by Mr. Evelyn, then Chief Clerk at the Government Office at St. Lucia, that a coniferous tree was found on the top of this Piton and that it was the Pencil Cedar. It was, however, not until quite recently that Mr. C. Devaux succeeded in securing specimens from that almost inaccessible locality. There are, according to him, only half-a-dozen trees there and they are stunted by wind. The altitude of the station where the tree grows is given as 2460 feet. A fruiting specimen, together with a section of a branch to show the wood, have been received at Kew from the Commissioner of Agriculture. The tree proves to be *Juniperus barbadensis*, L., a species closely allied to *J. virginiana*, L., and *J. bermudiana*, L., with both of which it is frequently confused, as has been pointed out by Professor Sargent (Sylva of N. America, xiv., p. 89, t. 738). The area of this tree on the continent is distinctly littoral, extending on the Atlantic Coast from Southern Georgia to about 27° N. lat. in Florida, and on the Gulf Coast of Florida from about 27° to 30° N. lat., but it also includes a number

of widely scattered stations in the West Indies, as the Bahamas, San Domingo, and the Blue Mountains of Jamaica, as well as St. Lucia. In Barbados it was in existence at least until 1830, when Maycock (Flora Barbadiensis, p. 395), recorded it from there as a "by no means common tree." Since that time it has not been mentioned as occurring in the island. In the Blue Mountains of Jamaica it is now rare, and ranges from 3500–6000 feet; in San Domingo it was found at 5000 feet, and in St. Lucia, as stated above, at 2460 feet. These mountain stations evidently represent only the last remains of a former much wider vertical range in the islands, where, as in Florida, the tree was much sought for on account of its highly priced wood.

O. S.

A Hybrid Heath.—An interesting specimen of a heath has been received from Mr. P. D. Williams, who collected it on moorland near Lanarth, St. Keverne, Cornwall. Its characters appear to point to its being a hybrid between *Erica tetralix*, L., and *E. vagans*, L. The chief points of resemblance and difference in the three plants are enumerated below, and the anatomical characters of the supposed parents and hybrid have also been examined.

Erica tetralix, L. Stems wiry, with elongate, straggling, pubescent or tomentose and sometimes glandular branches. Leaves in whorls of four, oblong or oblong-ovate, 3 mm. long., 0·5–1 mm. broad, white below, with revolute margins which are clothed with glandular hairs often 0·5 mm. long. Flowers in reduced lateral racemes, of from 1 to 3 flowers, which are clustered at the end of the central axis and so form a false umbel. Sepals lanceolate, the margins covered with long glandular hairs. Corolla oval-urceolate, 7 mm. long, pale rose in colour, with shortly triangular, reflexed teeth. Stamens included in the corolla; anthers yellow, the lobes united and with two appendages at the base. Style exserted. Ovary often pubescent.

Erica vagans, L. Stems stout with stiff, erect, glabrous branches. Leaves in whorls of four, linear, 6 mm. long and about 0·5 mm. broad, flat above, convex below with a deep furrow, margins not revolute, and without glandular hairs. Flowers in racemes of 3 to 5 flowers, the racemes being arranged on a long central axis which is usually terminated by leaves. Sepals ovate and minutely ciliate. Corolla campanulate, widely open at the mouth at the time of flowering, 3·5–4 mm. long, pink in colour, and with four rather large erect segments. Stamens projecting a quarter of their length from the corolla; anthers dark brown, lobes separate from the base, and without appendages. Style exserted. Ovary glabrous.

Erica vagans × *tetralix*. Stems straggling with slightly pubescent branches. Leaves crowded on the branches in whorls of four, linear-oblong, 4–5 mm. long and 0·75–1 mm. broad, flat above, slightly convex below with a conspicuous furrow, margins not revolute, with very short glandular hairs. Flowers arranged in lateral racemes which sometimes arise from a long central axis terminated by leaves, but sometimes are condensed and situated

near together at the apex of the axis. Sepals ovate-lanceolate, minutely ciliate, and sometimes with a few, very short, glandular hairs. Corolla campanulate, open at the top, 4 mm. long, pink in colour, with four erect segments. Stamens included in the corolla ; anthers nearly as in *E. vagans* but smaller, the lobes being divided from the base, having no appendages and being dark brown in colour. Style exserted. Ovary minutely pubescent.

The only hybrid heath previously recorded from Cornwall is *E. Watsoni*, Benth. (in DC. Prod. vii. 665), a hybrid between *E. ciliaris* and *E. tetralix*. In Davey, Flora of Cornwall, p. 282, this plant is recorded from many localities in the two botanical districts of "North Coast" and "Fal."

W. B. T.

A comparison of the hairs and internal tissues of the leaf has been made in *E. vagans*, *E. tetralix*, *E. ciliaris* and the supposed hybrid *vagans* × *tetralix*. The following characters, which were noted in the specimens examined, do not carry much weight, but appear to suggest *E. tetralix* and *E. vagans* as parents.

The glandular hairs of Mr. Williams' plant are of the same type as those of *Erica tetralix*, but are much shorter. Glandular hairs are not present in *E. vagans*.

The heads of the glandular hairs are broader in the hybrid and in *E. tetralix* than in *E. ciliaris*. The amount of sclerenchyma accompanying the median vascular bundle is greater in the hybrid and in *E. tetralix* than in *E. ciliaris* and *E. vagans*. The upper surface of the leaf (disregarding the apex, margin and base), may bear a fair number of scattered clothing hairs in the hybrid. On the same part of the leaf, hairs are numerous in *E. tetralix*, absent or practically absent in *E. vagans* and *E. ciliaris*.

In the hybrid heath the clothing hairs on the petiole and margin of the leaf are short, and thus suggest *E. ciliaris* rather than *E. tetralix*, but this character may be due to the influence of *E. vagans*, in which these hairs, where present, are very short.

The anthers are like those of *E. vagans*, and the pollen, or at any rate some of it, is bad.

L. A. B.

Botanical Magazine for October.—The plants figured are *Lissochilus stylites*, Reichb. f. (t. 8397) ; *Aphelandra fascinator*, Linden and Andre (t. 8398) ; *Spiraea Wilsoni*, Duthie (t. 8399) ; *Rhododendron ambiguum*, Hemsl. (t. 8400) ; and *Buddleia officinalis*, Maxim. (t. 8401).

The *Lissochilus* resembles several of its congeners in having large and showy rose-purple flowers, and is nearest allied to *L. arenarius*, Lindl., but is considerably larger in all its parts. The type specimen was collected in the Monbuttu Country, South Central Africa. The species has since been obtained from Angola, and the material for the present plate was furnished by a plant received from Ikom on the Cross River, Southern Nigeria, by the Hon. Mrs. Foley, in whose collection at Packham, Fordingbridge, Hants, it flowered in June, 1909.

Aphelandra fascinator is aColombian species which has been in cultivation since 1873, having been introduced by Mr. J. Linden. The leaves are attractive as well as the dense spikes of brilliant scarlet flowers, and as the latter are freely produced during the winter months we have in this Acanthad a particularly useful plant for the warm moist greenhouse.

Spiraea Wilsoni has been introduced into cultivation by Messrs. J. Veitch & Sons, and the material for the figure was supplied by them from one of the original plants growing in their Coombe Wood Nursery. A native of Central China it is closely allied to *S. Henryi*, Hemsl. (t. 8270 of the Botanical Magazine) and *S. Veitchii*, Hemsl. (t. 8383), both also Chinese species which closely resemble the more familiar Himalayan *S. canescens*, D. Don. *S. Wilsoni* has rather small leaves, which are often 3-toothed at the apex, and rounded corymbs of small white flowers terminating the short branches.

The *Rhododendron* is a new species which Messrs. Veitch have obtained from Western China. It is probably most nearly allied to the Himalayan *R. triflorum*, Hook. f., and is chiefly interesting on account of its yellow flowers.

Buddleia officinalis is very similar to the now well-known *B. variabilis*, Hemsl., of which several fine forms have been introduced into gardens by Messrs. Veitch. It differs in having the corolla pubescent outside, and also in the character of the tomentum on the underside of the leaves. The specimen figured was obtained from a plant raised from seed presented by Professor Sargent of the Arnold Arboretum, to which establishment it had been sent by Mr. E. H. Wilson from the Yang-tze valley. The species is also found in the provinces of Shensi and Kansu, and its flower-buds are collected and carried to Hankow, where they are sold as a medicine.

Botanical Magazine for November.—The plants figured are *Caladium pubescens*, N. E. Br. (t. 8402); *Rhododendron japonicum*, Schneider, var. *pentamerum*, Hutchinson (t. 8403); *Leonotis dysophylla*, Benth. (t. 8404); *Phyllodoce amabilis*, Stapf (t. 8405); and *Ruellia Devosiana*, Morren (t. 8406).

Caladium pubescens is a new species introduced from Peru by Messrs. Sander & Sons, who presented to Kew the plant from which the material for the figure was obtained. It is remarkable in having leaves, peduncle and spathe clothed with pubescence, an unusual condition in the genus and indeed in the order.

The *Rhododendron* is an attractive pink-flowered plant and a new variety, which differs from the typical form in having a 5-lobed corolla, 10 or 11, instead of 14 stamens, and a 5-celled ovary. Like the type it is Japanese, and the plant which furnished the specimen figured was imported from Tokyo in 1894.

The genus *Leonotis* has been represented in gardens for about a century by the brilliant-flowered *L. Leonurus*, R. Br., and this species, a native of South Africa, is probably the best of the genus for the horticulturist. *L. dysophylla* has broader leaves than

L. Leonurus and differs in the dentition of the calyx. It is found in the Transvaal, Orange River Colony, Transkei, Griqualand East and Natal. The illustration was prepared from a specimen sent to Kew in January last by the Curator of the Cambridge Botanic Garden, who received seeds from Mr. G. Thorncroft, Barberton, Transvaal.

Phyllodoce amabilis is a new species allied to *P. empetriformis*, A. Gr., and *P. intermedia*, A. Gr., from both of which it may be distinguished by its campanulate instead of urceolate corolla. It is almost certainly native either of the Rocky Mountains or of the Cascade Range, and has been in cultivation at Kew for some years.

Ruellia Devosiana is Brazilian, and was introduced by Messrs. Jacob-Makoy of Liége in 1875. The plant which furnished the material for the figure was received from the Jardin des Plantes, Paris, in 1903. Through rather insignificant in its flowers it has decorative leaves, and is suitable as a trailer or basket-plant for the warm greenhouse.

The Reclamation of Sand Dunes.—In 1909 the New Zealand Government issued a report by Dr. L. Cockayne on the sand dunes of the Dominion. That report (see *K.B.*, 1910, p. 99) dealt especially with the formation and movements of dunes, and of their ecological botany. The subject of dune-reclamation was reserved for a future occasion.

A further and complete report on the subject has now been issued.* The geological and botanical descriptions given in the previous account are extended, and form part i of the present treatise, whilst dune-reclamation forms the subject of part ii.

It is pointed out by Dr. Cockayne that the final object of reclamation should be the improvement of the sand-areas as a whole through their occupation by a continuous plant-covering that shall be of commercial value; but before this goal is reached several stages must be passed, the first of which is the checking of moving and encroaching sand. The experience gained in Europe as well as in other countries shows that the most efficacious sand-binding plant is undoubtedly the marram grass (*Ammophila arenaria*), and that for fixing drifting sand it cannot be beaten. Where there is no drift, or where there is a well fixed marram-area to windward, the tree lupin (*Lupinus arboreus*) is highly recommended for use in New Zealand. It is a good sand-fixer, and can be grown in pure sand in practically all parts of the country. Details are given as to the method and cost of marram-planting, and as to the subsequent management of the planted area.

With regard to the establishment of pastures and farm lands on dune areas, the principles to be followed are those which are learned from the ecological study of the sand dunes. In the botanical section of the report, the natural evolution of the fixed sand area from the mobile dune is traced, and it is possible to

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* Report on the Dune-areas of New Zealand, their Geology, Botany and Reclamation, by L. Cockayne. New Zealand, Department of Lands, 1911.

develop artificially a succession of plant-associations which should culminate in a permanent and fairly staple pasture. In the case of afforestation it is only necessary to keep the sand in check till the trees are well established, at which time, if sufficiently close, they will form a perfect shelter to easily blown sand. But in the formation of pastures the case is different. The wind is continually blowing over the surface and opposing the formation of thick turf. The great object, therefore, in pasture-making, after checking moving sand, is to increase the cohesion of the upper sand-layer, and with this in view plants producing the maximum amount of humus should be selected. These may be succeeded by the use of those pasture-plants which form a good permanent turf. A list of the most suitable grasses, clovers, and fodder-plants is provided, together with much valuable information as to planting and treatment in different types of locality.

Whilst the farming of dune-areas is largely practised in New Zealand, afforestation has up to the present hardly been attempted. A number of suggestions however are given. Many trees are known to flourish in pure sand in various parts of the Dominion, and others, such as *Olearia Traversii* and several pines, are capable of resisting salt-gales, and thus may be used for planting close to the shore. Within this shelter-belt, species of acacia, eucalyptus, and other well known sand-tolerating trees and shrubs may be successfully grown. Advice on tree planting and management is tendered, but the author emphasises the need of caution and of further experiment. The report concludes with a list of plants suitable for dune-cultivation in New Zealand, and with a bibliography of 140 titles.

A. D. C.

Trees and Shrubs.—Professor Sargent's monumental work "The Silva of North America," of which the first volume was published in 1891, was concluded in 1902. It comprises 14 handsome quarto volumes illustrated by 740 plates prepared from nature by Mr. C. E. Faxon, and its publishers are Messrs. Houghton Mifflin Company of Boston and New York. Author, artist, printer and all concerned in the production of this work have each aimed at a high standard of bibliographical perfection, with the result that "The Silva of North America" is easily the best work of its kind. Naturally this fine series of volumes is costly and always will be. The publishers' price is $350.

The publication which is the subject of the present note may be regarded as supplementary to the "Silva." Its full title is: "Trees and Shrubs: Illustrations of new or little known Ligneous Plants, prepared chiefly from material at the Arnold Arboretum of Harvard University and edited by Charles Sprague Sargent." It is quarto in size and is issued in parts, each containing 25 plates with descriptive text, four parts forming a volume. The first part was published in November 1902, and the third part of the second volume, issued in June of the present year, has, like the preceding, reached Kew from Messrs. Houghton Mifflin Company, the publishers of the work. The price of each part is $5 net. The excellent drawings (uncoloured) are prepared by Mr. C. E. Faxon.

"Trees and Shrubs" includes not only North American woody plants, but new or little known species from other regions, especially those likely to flourish out of doors in the United States and Europe, and others possessing particular commercial value.

The editor has secured the collaboration of several specialists the chief of whom, from his numerous contributions, is Mr. Alfred Rehder, who is responsible for the text accompanying 85 out of the 175 plates so far published.

Prof. Sargent supplies the text to 70 plates, 42 of which are given to *Crataegus*, all but one being new species. This genus, which appears to be so extraordinarily variable in North America, has during the last 15 years received a great deal of attention from American botanists, particularly from Mr. C. D. Beadle, Mr. W. W. Ashe and Prof. Sargent. Previous to 1896 the total number of species generally recognised amounted to less than 70, including 14 from North America. Since, and chiefly during the last few years, new species have been created in hundreds, the precise number of American species described since 1896 being 922. Writing on "The genus *Crataegus* in North America" (Journal of Botany, 1907, p. 289) Prof. Sargent does not support the theory that the many forms of the genus in North America are hybrids of recent origin. Many seedlings have been raised in the Arnold Arboretum and they do not show the tendencies to variation usually found in the offspring of recent hybrids. They do not vary in foliage, flowers or fruit, and Prof. Sargent has never seen what seemed to him to be a hybrid *Crataegus*. He finds that the time of flowering, number of stamens, colour of anthers, time of ripening and the nature of the fruit, and the form of the nutlets, are constant and can be depended on as distinguishing characters.

At t. 51 a figure is given of the Chinese Tulip Tree which the editor describes under the name of *Liriodendron chinense*. It was formerly regarded as a variety of *L. Tulipifera*, but it differs in the flowers, which are not more than half as large, with much narrower petals, and in the elongated fruit-cone and the shape of the inner carpels. This plant is especially interesting since it forms another connecting link between the floras of Eastern North America and Eastern Asia. The genus as now understood contains only 2 species, one from each of the regions named. It is shown that formerly *Liriodendron* was widely spread over North America and Europe.

The small genus *Hamamelis* is similarly interesting. Until very recently only 3 species (or 4 if *H. arborea*, Masters, is held to be distinct from *H. japonica*) were known: *H. virginiana*, L., which is widely distributed in Eastern North America, *H. japonica*, Sieb. & Zucc., from Japan and the Province of Kiangsi, Central China, and *H. mollis*, Oliv., from Central China. In the last part of "Trees and Shrubs" (t. 136, p. 137) Prof. Sargent figures and describes a second American species under the name of *H. vernalis*. This is recorded from Missouri, Arkansas and Oklahoma. A specimen with fragmentary flowers from Texas probably belongs to the same species.

Ulmus japonica, Sargent (t. 101) is based on *U. campestris* var. *japonica*, Rehder (var. *laevis*, Fr. Schmidt). It resembles both *U. americana*, Linn. and *U. campestris*, Linn.

Mr. Rehder has described numerous species of *Viburnum*, (25 figured), *Acer* (17 figured), *Lonicera* (12 figured) and of other genera including *Cornus*, *Euonymus* and *Malus*. *Picea morindoides*, Rehd. (t. 48), a species allied to *P. Alcockiana*, Carr., is known only in a cultivated state. The original tree grows in the arboretum of Mr. G. Allard at Angers. At p. 175 of vol. i., Mr. Rehder gives a conspectus of the sections and species of *Acer* of Eastern Continental Asia. This is followed by an enumeration which includes 44 species, many of which have been introduced into cultivation by Messrs. James Veitch & Sons, and the Director of the Arnold Arboretum. The genus *Viburnum* has been similarly dealt with in vol. ii. p. 105. Mr. Rehder's enumeration includes 65 species from Eastern Asia. The species of *Lonicera* figured are mainly Chinese.

Mr. J. M. Greenman has founded two new genera. *Faxonanthus* (t. 12) is a shrubby plant belonging to the *Scrophulariaceae* and allied to *Leucophyllum*. *F. Pringlei*, the only species, is based on Pringle's No. 8594, collected near Tehuacan, Mexico. *Grypocarpha* (t. 73) is a glabrous much-branched shrubby monotypic Composite, whose nearest ally is *Heliopsis*. It also is Mexican, *G. Nelsoni* having been discovered in the State of Chiapas by E. W. Nelson.

The Pines, of which 4 are figured, including *Pinus Altamirani*, n. sp. (t. 99) and *P. Pringlei*, n. sp. (t. 100), from Uruapan, Mexico, are described by Mr. G. R. Shaw, the author of "The Pines of Mexico," a thin quarto volume containing 22 plates by Mr. Shaw himself, which was issued in March, 1909, as "Publications of the Arnold Arboretum No 1." A copy of this work, which has every appearance of being well done, has been presented to Kew by Prof. Sargent. *Pinus terthrocarpa*, Shaw (t. 75 of "Trees and Shrubs") is based on *P. cubensis* var.? *terthrocarpa*, Griseb.

The genus *Dracaena* till recently was known only from the Old World. A species most nearly allied to *D. Draco*, Linn., of the Canary Islands, has now been discovered in Central America where it is widely distributed. A figure of this interesting plant is given at t. 98, and is described by Mr. J. Donnell Smith as *D. americana*. The species is in cultivation at the New York Botanic Garden.

Other contributors to "Trees and Shrubs" are Miss Alice Eastwood, who describes two new species of *Arctostaphylos* from California, *A. virgata* (t. 96) and *A. vestita* (t. 97); Mr. M. L. Fernald, the author of two new species from Mexico, *Ehretia viscosa* (t. 13) and *Solanum molinum* (t. 49); and Prof. B. L. Robinson, who has of late years given much attention to the *Eupatorieae*, supplies the text to (t. 9) *Eupatorium Loesenerii*.

Taxonomists are deeply indebted to Prof. Sargent for the wealth of information on ligneous plants which in his various fine works he has rendered accessible to them. In "Trees and Shrubs" the same high character which distinguishes all the publications with which his name is associated as author or editor is maintained, and we trust that for many years to come he will be able and willing to continue it.

S. A. S.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 10.] [1911.

LIII.—CONTRIBUTIONS TO THE FLORA OF SIAM.

II. List of Siamese Plants, with Descriptions of New Species—*continued.**

W. G. Craib.

GAMOPETALAE.

Caprifoliaceae.

Viburnum atro-cyaneum, *C. B. Clarke*, F.B.I., iii. p. 7.

Doi Chieng Dao, 2180 m., *Hosseus*, 392 (Herb. Kew ! et Copenhagen !).

Distr. Mishmi, Manipur.

Viburnum cylindraceum, *Ham.* *V. coriaceum*, Bl.—F.B.I., iii. p. 5.

Chiengmai, Doi Sootep, in evergreen jungle, 1500 m., *Kerr*, 1389.

Distr. Himalayas, Burma, Assam, Yunnan, Java.

Viburnum inopinatum, *Craib*, sp. n., a *V. sambucino*, Reinw., foliis subtus molliter pubescentibus, calycis dentibus minoribus, corolla parum majore, filamentis antherisque longioribus recedit.

Frutex vel arbuscula (ex *Kerr*); ramuli primo densius breviter albo-pubescentes, plus minusve glabrescentes, cortice rubro-brunneo parce lenticellato obtecti. *Folia* late oblanceolata, oblongo-oblanceolata vel ovato-elliptica, apice acuminata, acutiuscula, basi cuneata, 9–19 cm. longa, 3·6–7·3 cm. lata, chartacea, supra glabra, subtus molliter pubescentia, nervis lateralibus utrinque 5–7 supra cum nervis transversis leviter impressis subtus prominentibus intra marginem arcuatis; petioli 0·7–4 cm. longi, supra sulcati. *Corymbae* terminales, umbelliformes, 9·5–13 cm. diametro; pedunculi 7, 3–4·5 cm. longi. *Calycis* dentes minuti. *Corollae* albae tubus 1·5 mm. longus, lobi 1·25 mm. longi, vix 1·5 mm. lati. *Filamenta* 5–6·5 mm. longa, glabra, antheris 1 mm. altis.

Chiengmai, in evergreen jungle on Doi Sootep, 600–900 m., *Kerr*, 932, 932a.

Lao name, Dauk oon.

Lonicera Hildebrandiana, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 64.

Chiengmai, among rocks on Doi Sootep, 1380 m., *Kerr*, 598.

Distr. Upper Burma.

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* Continued from *K.B.* 1911. p. 60.

(21716—6a.) Wt. 118—9. 1125. 11/11. D & S.

Rubiaceae.

Anthocephalus indicus, *A. Rich.*—Haviland, Journ. Linn. Soc., xxxiii. p. 23. *A. Cadamba*, Miq.—F.B.I., iii. p. 23. *Sarcocephalus Cadamba*, Kurz, For. Fl. Burma, ii. p. 63.

Chiengmai, edge of clearing on Doi Sootep, 660 m., *Kerr*, 1215.

Distr. India, Assam, Tonkin, Malaya.

Lao name, Mai Toom.

Adina polycephala, *Benth.*—F.B.I., iii. p. 25; Haviland, Journ. Linn. Soc., xxxiii. p. 46. *Nauclea polycephala*, Wall.—For. Fl. Burma, ii. p. 65.

Chiengmai, by stream on Doi Sootep, 660–750 m., *Kerr*, 1065, 1764.

Distr. India, Burma, Cambodia, Cochinchina, Malaya.

Mitragyna diversifolia, *Haviland*, Journ. Linn. Soc., xxxiii. p. 71. *Stephegyne diversifolia*, Hook. f., F.B.I., iii. p. 26; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 64. *Nauclea parvifolia*, Roxb., var. *diversifolia*, Kurz, For. Fl. Burma, ii. p. 67.

Phre, 156-240 m., *Luang Vanpruk*, 129; Meh Ping, Kampeng, *Kerr*, 2033.

Distr. Chittagong, Burma, Philippines.

Mitragyna hirsuta, *Haviland*, Journ. Linn. Soc., xxxiii. p. 72.

Chiengmai, Doi Sootep, deciduous jungle, 300–450 m., *Kerr*, 661.

Distr. Cochinchina.

Uncaria laevigata, *Hook. f.*, .B.I., iii. p. 30; Haviland, Journ. Linn. Soc., xxxiii. p. 90.

Chiengmai, Doi Sootep, 900 m., *Hosseus*, 317.

Distr. Khasia, Manipur, Tenasserim.

Uncaria macrophylla, *Wall.*—F.B.I., iii. p. 32; Haviland, Journ. Linn. Soc., xxxiii. p. 84.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 692.

Distr. Bhutan, Khasia, Cachar, Manipur, Yunnan.

Nauclea sp. near *N. purpurascens*, Korth. *N. purpurea*, K. Sch., Bot. Tidsskr., xxiv. p. 331; Williams, Bull. Herb. Boiss., v. (1905) p. 951, *vix* Roxb.

Klong Son, *Schmidt*, 680 (in bud only!).

Hymenopogon parasiticus, *Wall.*—F.B.I., iii. p. 34; For. Fl. Burma, ii. p. 73.

Chiengmai, Doi Sootep, evergreen jungle, 1440 m., *Kerr*, 1392.

Distr. Himalayas, Burma, Assam, China.

Wendlandia glabrata, *DC.*—F.B.I., iii. p. 39; For. Fl. Burma, ii. p. 74; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 65.

Chiengmai, Doi Sootep, in deciduous jungle, 300–900 m., *Kerr*, 963; ? Phre, 156–240 m., *Luang Vanpruk*, 112 (in young bud only).

Distr. Mysore, Burma, China, Tonkin.

Wendlandia glabrata, *DC.*, var. **floribunda**, *Craib*, var. nov., a typa floribus congestis, alabastris apice pilosis, corollae tubo graciliore recedit.

Chiengmai, Doi Sootep, in open jungle, 1440 m., *Kerr*, 1674.

The species comprising the genus *Wendlandia* are very closely allied, and probably the plant here described as a variety may eventually have to be raised to specific rank.

Wendlandia paniculata, *DC.*—F.B.I., iii. p. 39.
Chiengmai, Doi Sootep, in mixed jungle, 660 m., *Kerr*, 1710, 1715.
Distr. Yunnan, Indo-China, Malaya.

Wendlandia tinctoria, *DC.*—F.B.I., iii. p. 38; For. Fl. Burma, ii. p. 74.
Doi Chieng Dao, 400 m., *Hosseus*, 472.
Distr. N. India, Burma, Yunnan.

Dentella repens, *Forst.*—F.B.I., iii. p. 42; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 65; Williams, Bull. Herb. Boiss., v. (1905) p. 950.
Chiengmai, 300 m., *Kerr*, 1476; Koh Chang, Klong Sarlakpet, *Schmidt*, 731.
Distr. Trop. Asia, Australia, Polynesia, America Cent.

Argostemma stellatum, *Craib*, sp. n., ab *A. verticillato*, Wall., antheris longioribus haud liberis facile distinguenda.

Herba erecta, 5–12 cm. alta, foliis supra interdum pauperrime brevissime setulosis exceptis omnino glabra. *Folia* 4, verticillata, anguste obovata, obovato-elliptica vel fere elliptica, apice plerumque breviter acuminata, obtusiuscula, basi cuneata, 1·2–3·5 cm. longa, 0·8–2 cm. lata, sessilia vel subsessilia, membranacea, supra fusco- subtus pallide viridia, nervis lateralibus utrinque circiter 5 pagina utraque subconspicuis. *Inflorescentia* terminalis, e pedunculis 1–5 fasciculatis unifloris vel dichotome cymosis laxe paucifloris constituta, pedunculo communi ad 2·5 cm. longo, pedicellis 1·5–2·3 cm. longis. *Corolla* alba (ex *Kerr*), fere rotata, lobis 4–5 anguste lineari-lanceolatis circa 8 mm. longis 2 mm. latis. *Filamenta* brevissima; antherae in columnam corolla paullo breviorem conniventes, connectivo producto.

Chiengmai, Meh Hia, damp rocks by stream, 390 m., *Kerr*, 1413.

Argostemma verticillatum, *Wall.*—F.B.I., iii. p. 43, pro parte.
Chiengmai, on damp rocks on Doi Sootep, 720 m., *Kerr*, 728.
Distr. Himalayas, Khasia, Burma, Yunnan.

Oldenlandia auricularia, *F. Muell.*—Williams, Bull. Herb. Boiss., v. (1905) p. 950. *O. costata*, K. Sch., Bot. Tidsskr., xxiv. p. 330; Williams, l.c. p. 950, non *Spermacoce costata*, Roxb. *Hedyotis auricularia*, Linn.—F.B.I., iii. p. 58.
Koh Chang, *Schmidt*, 412.
Distr. S.E. Asia, Australia.

Oldenlandia coronata, *Williams*, Bull. Herb. Boiss., v. (1905) p. 950. *Hedyotis connata*, Hook. f., F.B.I., iii. p. 62.
Chiengmai, in evergreen jungle on Doi Sootep, 720 m., *Kerr*, 792.
Distr. Amherst, Mergui, Gia laa mè (*Pierre*, 2034).

Oldenlandia dichotoma, *Koen.*—F.B.I., iii. p. 67.
Raheng, *Lindhard.*
Distr. India, Malay Peninsula.

Oldenlandia diffusa, *Roxb.*—F.B.I., iii. p. 65.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1357.
Distr. S.E. Asia.

Oldenlandia hirsuta, *Linn. f.* *Hedyotis stipulata*, Br.—F.B.I., iii. p. 63.
Chiengmai, Doi Sootep, 690 m., *Kerr*, 1491.
Distr. Himalayas, China, Japan, Khasia, Malay Peninsula.

Oldenlandia hispida, *Benth.* *Hedyotis hispida*, Retz.—F.B.I., iii. p. 60.

Chiengmai, in mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 1234.

Distr. Himalayas, Burma, Assam, China, Philippines, Cambodia.

Oldenlandia nudicaulis, *Roth.*—F.B.I., iii. p. 70 ; Williams, Bull. Herb. Boiss., v. (1905) p. 951.

Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 767.

Distr. Himalayas, Burma, Assam, Java.

Oldenlandia paniculata, *Linn.*—F.B.I., iii. p. 69.

Chiengmai, 300 m., *Kerr*, 1474—"a garden weed."

Oldenlandia (Hedyotis) tenelliflora, *Bl.*, var. **Kerrii**, *Craib*, var. nov., a typa partibus omnibus paulo majoribus, cymis capitatis subsessilibus vel pedunculis usque ad 1 cm. longis suffultis differt.

Chiengmai, Doi Sootep, deciduous jungle, 300–750 m., *Kerr*, 821.

The genus *Oldenlandia* is here used to include the genus *Hedyotis* of the Flora of British India as proposed by Schumann in Engl. Pflanzenfam., and it is possible that in a revision of the genus the plant here treated as a variety may have to be regarded as a distinct species.

Oldenlandia Wallichii, *Craib*, comb. nov. *Hedyotis Wallichii*, Kurz—F.B.I., iii. p. 53.

Chiengmai, in deciduous jungle on Doi Sootep, 360 m., *Kerr*, 1498.

Distr. Andamans, Burma, Borneo.

Oldenlandia, sp. aff. *O. prostratae* (Korth.). *O. lineata*, K. Sch., Bot. Tidsskr., xxiv. p. 330 ; Williams, Bull. Herb. Boiss., v. (1905) p. 950, *non Hedyotis lineata*, Roxb.

Koh Chang, Klong Son, *Schmidt*, 634a !

Anotis quadrilocularis, *Hook. f.*, F.B.I., iii. p. 74.

Chiengmai, Doi Sootep, damp rocks by stream, 720 m., *Kerr*, 1421.

Distr. Ceylon, S. India.

Ophiorrhiza Harrisiana, *Heyne*, var. **argentea**, *Hook. f.*, F.B.I., iii. p. 78.

Chiengmai, in evergreen jungle on Doi Sootep, 660–900 m., *Kerr*, 1174, 1838.

Distr. Sylhet, Khasia.

Ophiorrhiza rosea, *Hook. f.*, F.B.I., iii. p. 78.

Chiengmai, Doi Sootep, 900–1350 m., *Kerr*, 709, 1254.

Distr. Khasia, Mishmi, Sikkim.

Mussaenda Hossei, *Craib*, sp. n., a *M. breviloba*, S. Moore, foliis tenuioribus indumento subtus parciore, sepalis expansis majoribus, corollae tubo usque ad 2·3 cm. longo eiusque indumento extus parciore differt.

Suffrutex circiter 1 m. altus (ex *Kerr*) ; ramuli graciles, primo densius breviter albo-pubescentes, mox fere glabri, cortice rubro-brunneo parce lenticellato obtecti. *Folia* oblanceolata vel oblongo-oblanceolata, apice acuminata, acuta, basi obtusa vel rotundata, 3–9 cm. longa, 1·5–3·4 cm. lata, chartacea, supra parce pilulosa, subtus imperfecte sericeo-pubescentia, nervis lateralibus utrinque circiter 8 supra conspicuis subtus prominulis nervis transversis

obscuris, petiolis usque ad 0·5 cm. longis suffulta ; stipulae angustè lanceolatae, apice plus minusve bifidae, acutae, 5–7 mm. longae, 2–3 mm. latae. *Receptaculum* subellipsoideum, 2·5 mm. altum, 2 mm. diametro. *Sepala* normalia lanceolata, acuta, 2 mm. longa. 0·5 mm. lata, aucta alba (ex *Kerr*), ad 5·5 cm. longa, 4 cm. lata. *Corollae* aurantiacae (ex *Kerr*) tubus 2·2–2·3 cm. longus, superne dilatatus, extra, superne praecipue, strigillosus, intra apicem versus villosus, lobi suborbiculares, acuminati, circa 2 mm. diametro. *Antherae* 4 mm. longae, filamentis brevibus. *Fructus* oblongo-ellipsoideus, 1·8 cm. altus, 0·8 cm. diametro, lenticellatus, sepala perpauca persistentia gerens.

Chiengmai, Doi Sootep, *Hosseus*, 242 (Herb. Kew! Hoss.! et Copenhagen !), in deciduous jungle, 300–900 m., *Kerr*, 926, 936a.

Hosseus, 447 also from Doi Sootep is probably only a form of *M. Hossei* differing chiefly in the sparser indumentum of the inflorescence.

Mussaenda Kerrii, *Craib*, sp. n., ex affinitate *M. polyneurae*, King, a qua foliis formae diversae majoribus, cortice brunneo vel rubro-brunneo, stipulis parvis recedit.

Frutex scandens (ex *Kerr*) ; ramuli teretes, ad 4 mm. diametro, primo puberuli, mox glabri, cortice pallide brunneo vel rubro-brunneo striato parce lenticellato obtecti. *Folia* oblanceolata, oblongo-oblanceolata vel rarissime obovato-oblanceolata, apice acuminata, basi cuneata, 8–22 cm. longa, 2·5–6 cm. lata, chartacea, utrinque glabra nisi nervis subtus brevissime appresse pilulosa, subtus pallidiora, nervis lateralibus utrinque 7–9 arcuatis supra conspicuis subtus prominulis, nervulis utrinque, subtus magis, conspicuis ; petioli 1 cm. longi, supra canaliculati, subglabri ; stipulae deciduae, acuminatae, 2 mm. longae. *Cymulae* in corymbos foliis breviores dispositae, pedunculo communi usque ad 5 cm. longo, pedunculis partialibus ad 1·5 cm. longis, pedicellis brevibus ; bracteae parvae. *Receptaculum* glabrescens, circiter 3 mm. altum. *Calycis* lobi ut videtur post anthesin decidui, normales lineari-lanceolati, acuti, 1–1·5 mm. longi, parce setulosi et breviter setuloso-ciliati, aucti albi (ex *Kerr*), majusculi, longe petiolati. *Corollae* tubus 2·5 cm. longus, extus glabrescens, intus pilosus, lobi deltoidei, acuminati, 3 mm. longi, 1·5–2 mm. lati. *Antherae* anguste lineares, 4 mm. longae.

Chiengmai, marshy ground in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1112 ; Phre, 180 m., *Luang Vanpruk*, 196.

Vern. Dọk Kem bai (ex *Luang Vanpruk*).

Mussaenda sootepensis, *Craib*, sp. n., ab affini *M. incana*, Wall., ramulorum indumento breviore parciore, foliis valde minoribus, corollae tubo breviore indumento parciore distincta.

Suffrutex parvus ; ramuli primo breviter pilosi, mox fere glabri, cortice rubro-brunneo striato obtecti. *Folia* elliptica, ovato-lanceolata vel ovata, apice distincte vel vix acuminata, obtusiuscula, basi attenuata vel rotundata, 3–6 cm. longa, 1·3–3·3 cm. lata, chartacea, supra pilis basi incrassatis instructa, subtus hirsuta, nervis lateralibus utrinque 6 pagina utraque conspicuis ; petioli ad 4 mm. longi ; stipulae lanceolatae, 5 mm. longae, apice plus minusve bifidae. *Cymulae* in corymbos terminales dispositae ; bracteae parvae, lineari-lanceolatae ; pedicelli breves. *Receptaculum* 3 mm. altum,

dense hirsutum. *Calycis* lobi 5 mm. longi ; sepala in lamina expansa rara, parva. *Corollae* luteae tubus 2·2 cm. longus, lobi acuminati, 6 mm. longi, 3 mm. lati. *Antherae* anguste lineares, 4 mm. longae, filamentis circiter 1 mm. longis.

Chiengmai, Doi Sootep, deciduous jungle, 600 m., *Kerr*, 1183.

Dr. Kerr describes this plant as a low straggling shrub but I cannot distinguish specifically from it his 744 also collected in deciduous jungle on Doi Sootep 300–720 m. which he describes as having prostrate creeping shoots. The latter would appear to have grown under more adverse conditions and has slightly narrower leaves which dry brown.

Mussaenda uniflora, *Wall.*—F.B.I., iii. p. 86.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 680 ; Muang Fang, 500 m., *Hosseus*, 603.

Distr. Lower Burma.

Mussaenda sp. allied to *M. Kerrii*, *M. polyneura*, and probably to *M. Wallichii* but too incomplete to admit of certainty.

Chiengmai, Doi Sootep, *Hosseus*, 241.

Mycetia cauliflora, *Reinw.*, forma ?

Chiengmai, Doi Sootep, evergreen jungle by stream, 900 m., *Kerr*, 1833.

Distr. Java, Yunnan.

Mycetia longifolia, *K. Sch.* *Adenosacme longifolia*, Wall.—F.B.I., iii. p. 95 ; For. Fl. Burma, ii. p. 54.

Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1148.

Distr. Himalayas, Burma, Assam, Yunnan, Tonkin, Malaya.

Randia dumetorum, *Lamk.*—F.B.I., iii. p. 110.

Chiengmai, Doi Sootep, 300–450 m., *Kerr*, 568.

This plant is identical with the plant referred to *R. tomentosa* by Collett and Hemsley in Journ. Linn. Soc., xxviii. p. 66. In the writer's opinion it is referable rather to *R. dumetorum* in the wide sense and may possibly be *R. nutans*, DC.—a species maintained in For. Fl. Burma, ii. p. 45.

Randia Griffithii, *Hook. f.*, F.B.I., iii. p. 112 ?

Chiengmai, Doi Sootep, evergreen jungle, 1050 m., *Kerr*, 1776.

Distr. Khasia.

This species is represented at Kew by fruiting specimens only, and those collected by Dr. Kerr are all in flower.

Randia longiflora, *Lamk.*—F.B.I., iii. p. 111, pro parte ; Williams, Bull. Herb. Boiss., v. (1905) p. 952, pro parte.

Klong Son, *Schmidt*, 652.

Distr. China, Indo-China, Malaya.

Randia longiflora, *Lamk.*, var. ? *R. fasciculata*, K. Sch., Bot. Tidsskr., xxiv. p. 332 ; Williams, Bull. Herb. Boiss., v. (1905) p. 952, *non* DC.

Klung, *Schmidt*, 372.

Randia siamensis, *Craib*, nom. nov. *R. longiflora*, Lamk.—F.B.I., iii. p. 111, pro parte ; Williams, Bull. Herb. Boiss., v. (1905) p. 952, pro parte. *Webera siamensis*, Kurz, For. Fl. Burma, ii. p. 48. *Griffithia siamensis*, Miq.

Chiengmai, in deciduous (eng) jungle, 300 m., *Kerr*, 583 ; Cape Liant, *Murton*, 52 ; Bangkok, *Schomburgk*, 113.

Distr. Burma.

The writer cannot acquiesce in the treatment of *R. longiflora* in the Flora of British India, l.c. and proposes the name *R. siamensis* for the Indo-China plant with the short corolla tube which was originally described by Miquel as *Griffithia siamensis*.

Randia similis, *Craib*, sp. n., a *R. hygrophila*, Hook. f., cui affinis, floribus paulo minoribus solitariis ad apices ramulorum brevium lateralium gestis, calycis lobis haud ciliatis recedit.

Ramuli validi, cinerei, glabri, haud nitidi. *Folia* (vix matura ?) sessilia vel subsessilia, obovato-oblanceolata vel obovato-elliptica, apice rotundata, breviter apiculata, basi cuneata, 1·5–3·5 cm. longa, 0·5–1·5 cm. lata, rigide chartacea, utrinque fere glabra nisi subtus inter costam et nervos primarios floccosa, nervis lateralibus utrinque usque ad 12 pagina utraque conspicuis. *Flores* solitarii, ad apices ramulorum lateralium 2–5 cm. longorum gesti. *Receptaculum* turbinatum, circa 4 mm. altum, fere glabrum. *Calycis* lobi 5–6, subaequales, lineares, obtusiusculi, circiter 5 mm. longi, 1 mm. lati, glabri. *Corollae* extra pilosulae intra glabrae, tubus 1·6–1·8 cm. longus, superne leviter dilatatus, apice 6–7 mm. diametro, lobi 5–6, subaequales, obovati vel elliptico-obovati, apice rotundati, 1–1·4 cm. longi, 8–9 mm. lati. *Antherae* anguste lineares, 9 mm. longae. *Ovarium* 2-loculare ; stylus validus, glaber, stigmate fusiformi apice brevissime 2-dentato.

Lower Siam, Paknampo, common in dry deciduous jungle, *Witt*, 22.

Randia sootepensis, *Craib*, sp. n., a *R. macrophylla*, Hook. f., foliis minoribus, calycis lobis vix 4 mm. longis, corolla circiter 6·5 cm. tantum longa recedit.

Suffrutex ad 3·5 m. altus (ex *Kerr*), receptaculo calyceque exceptis fere omnino glaber. *Folia* lanceolata vel oblongo-lanceolata, apice acuminata, acutiuscula, basi cuneata, 5–15 cm. longa, 1·2–5 cm. lata, subcoriacea, nervis lateralibus utrinque 7–8 intra marginem arcuatis pagina superiore subconspicuis inferiore prominentibus, petiolis brevibus suffulta ; stipulae deciduae, deltoideae, 4 mm. longae, 2 mm. latae. *Flores* sessiles, gemini, pedunculo communi brevi suffulti. *Receptaculum* tubulosum, 6 mm. altum, 3 mm. diametro. *Calycis* tubus 3 mm. longus, lobi lanceolati, acuti, tubo aequialti ; calyx ut in receptaculo appresse albido-hirsutus, lobis intra appresse pubescentibus. *Corollae* albae et fauce purpureo-pictae (ex *Kerr*) tubus 5·5 cm. longus, parte basi tubulosa 2 mm. diametro superne ampliatus ad 1·2 cm. diametro, lobi 2 cm. longi, 1·2 cm. lati, apice obtusi. *Antherae* 1·4 cm. longae. *Stylus* 5 cm. longus, glaber.

Chiengmai, Doi Sootep, 660–800 m., *Kerr*, 1651, *Hosseus*, 451a.

Randia tomentosa, *Hook. f.*, F.B.I., iii. p. 110; *non* Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 66. *Gardenia dasycarpa*, Kurz, For. Fl. Burma, ii. p. 42 (ex F.B.I., l.c.).

Chiengmai, in deciduous jungle on lower slopes of Doi Sootep, 300–450 m., *Kerr*, 576 ; *Murton*, 140.

Distr. Burma, Cambodia, Java.

Randia uliginosa, *DC.*— F.B.I., iii. p. 110; For. Fl. Burma, ii. p. 44.

Chiengmai, in deciduous (eng) jungle, 300 m., *Kerr*, 579.

Distr. India, Burma.

Randia Wallichii, *Hook. f.*, F.B.I., iii. p. 113.

Chiengmai, Doi Sootep, 600 m., *Kerr*, 629, 1196, 1196a.

Distr. Bhutan, Yunnan, Burma, Khasia, Chittagong, Java.

Randia Wittii, *Craib*, sp. n., ab affini *R. exaltata*, Griff., foliis molliter pubescentibus, corolla multo majore facile distinguenda.

Arbor 4·5–7·5 m. alta (ex *Witt*); ramuli primo dense albo-pubescentes, mox glabri, cortice fusco-brunneo obtecti. *Folia* oblanceolata vel anguste elliptica, apice breviter acuminata, obtusiuscula, basi cuneata, ad 12·5 cm. longa, 6 cm. lata, subcoriacea, utrinque molliter pubescentia, nervis lateralibus utrinque 8–9 supra conspicuis subtus prominulis; petioli ad 8 mm. longi; stipulae deciduae, 3 mm. longae, 3·5 mm. latae. *Cymae* pseudo-axillares, pluriflorae, densius breviter hirsutae, pedunculo communi circa 0·5 cm. longo, pedicellis fere 1·5 cm. longis, bracteis deciduis. *Receptaculum* campanulatum, fere 4 mm. altum. *Calyx* ad 3 mm. altum, dentatum. *Corollae* albae tubi purpureo-picti (ex *Witt*) pars basi aequalis 7 mm. longa, 4 mm. diametro, pars superior campanulata, ad 3·5 cm. longa, apice 4 cm. diametro, lobi oblongi, obtusi, 2·5 cm. longi, 1·7 cm. lati. *Antherae* lineares, 1·4 cm. longae.

Lower Siam, Korat, in dry deciduous jungle, 60 m., *Witt*.

Gardenia erythroclada, *Kurz*—F.B.I., iii. p. 119; For. Fl. Burma, ii. p. 40; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 66.

Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 647.

Distr. Burma.

Gardenia obtusifolia, *Roxb.*—F.B.I., iii. p. 116; For. Fl. Burma, ii. p. 42. ? *G. sp.*, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 66.

Chiengmai, deciduous jungle, foot of Doi Sootep, 300–720 m., *Kerr*, 543.

Distr. Burma.

Gardenia sessiliflora, *Wall.*—F.B.I., iii. p. 118; For. Fl. Burma, ii. p. 40.

Chiengmai, mixed jungle, foot of Doi Sootep, 300 m., *Kerr*, 587.

Distr. Pegu.

Gardenia sootepensis, *Hutchinson*, sp. n., affinis *G. coronariae*, Ham., sed foliis subtus molliter tomentellis differt.

Arbor; ramuli teretes, apice foliacei, internodiis vix 1 cm. longis, cortice parce tomentello demum glabro. *Folia* obovata vel obovato-elliptica, breviter acuminata, acumine obtuso vel subobtuso, basi obtusa vel subacuta, 9–11 cm. longa, 3–5 cm. lata, rigide chartacea, supra viscida, puberula, subtus plerumque molliter tomentella, nervis lateralibus utrinque 15–20 leviter obliquis subtus valde prominentibus, venis subtus paullo conspicuis; petiolus ad 1 cm. longus, viscidus, puberulus; stipulae in tubum connatae, 1 cm. longae, truncatae, submembranaceae, ciliatae, demum leviter induratae et deciduae. *Flores* ad ramulorum apices solitarii; pedicelli 1–1·5 cm. longi, robusti, viscidi, puberuli. *Receptaculum* subcylindraceum, 5 mm. longum, puberulum. *Calyx* tubulosus, superne unilateraliter fissus, 1·3–1·5 cm. longus, extus viscidus, parce

pubescens, intus appresse pilosus. *Corolla* alba, demum flava (ex *Kerr*); tubus cylindraceus, 5–5·5 cm. longus, medio 3–4 mm. diametro, extus minute puberulus, intus glaber; lobi 5, late obovati, circiter 4 cm. longi et 3 cm. lati, venosi, glabri. *Antherae* supra medium affixae, 1·5 cm. longae, circiter 2 mm. exsertae vel inclusae. *Stylus* 6 cm. longus, sulcatus, inferne parce subappresse pubescens, stigmate clavato. *Ovarii* placentae 2. *Fructus* oblongo-ellipsoideus, 4 cm. longus, vix 3 cm. diametro, parce lenticellatus; pericarpium durum, lignosum, 2 mm. crassum. *Semina* ∞, foveolata.

Chiengmai, Doi Sootep, mixed jungle, 750 m., *Kerr*, 1794.

Griffith 2818 from Burma is probably this species, though the intermodes on the main branchlets are much longer than in the Siamese specimens.

Hyptianthera bracteata, *Craib*, sp. n., *H. strictae*, W. et A., valde affinis, a qua stipulis multo longioribus, calycis lobis majoribus, bracteolis conspicuis facile distinguenda.

Frutex ad 2·4 m. altus (*ex Kerr*), inflorescentia excepta glaber; ramuli subquadrangulares, cortice rubro-brunneo. *Folia* lanceolata vel ovato-lanceolata, apice acuminata, mucronata, basi cuneata, 13–16·5 cm. longa, 3·5–4 cm. lata, subcoriacea, margine integro, nervis lateralibus utrinque circiter 9 intra marginem arcuatis supra conspicuis subtus cum nervis transversis prominentibus; petioli 1 cm. vix attingentes; stipulae rigidae, dorso superne carinatae, usque ad 1 cm. longae. *Inflorescentia* generis. *Bracteae bracteolaeque* stipulis similes, calycis lobos vix aequantes, ciliatae. *Receptaculum* turbinatum, 1·5 mm. altum. *Calycis* lobi 3·5 mm. longi, acuti, ciliati. *Corollae* albae tubus vix 2 mm. longus, lobi 2 mm. longi, ciliolati. *Stamina pistillumque* generis.

Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1145; on old clearing on Doi Sootep, 750 m., *Kerr*, 1792.

This plant in its calyx and bracts somewhat resembles the narrow-leaved Khasia plant included in the Flora of British India under *H. stricta* but is readily distinguished from it by its leaves which are similar to typical *H. stricta*.

Diplospora siamica, *Craib*, sp. n., a *D. pubescente*, Hook, f., cui affinis, foliis tenuioribus longius petiolatis, calyce subtruncato, corolla majore recedit.

Ramuli primo pubescentes, mox glabri, ad 5 mm. diametro. *Folia* ovato-lanceolata, oblongo-oblanceolata vel obovato-elliptica, apice acuminata, obtusiuscula, basi nonnunquam inaequalia, cuneata, 11–19 cm. longa, 5·2–7·2 cm. lata, chartacea, supra costa pilulosa excepta glabra, subtus costa nervisque pubescentia, integra, nervis lateralibus utrinque 7–10 intra marginem arcuatis supra sicco cum costa plerumque impressis subtus prominentibus; petioli circiter 1 cm. longi, ut in ramulis pubescentes; stipulae connatae, subulato-acuminatae, ad 8 mm. longae. *Inflorescentia* ex axillis foliorum delapsorum, petiolos subaequans; pedicelli breves; bracteae bracteolaeque parvae, ciliatae, illae connatae, hae liberae. *Receptaculum* campanulatum, 0·75 mm. altum, 1 mm. diametro, glabrum. *Calyx* subpatelliformis, 1 mm. altus, fere 2 mm. diametro, subtruncatus, pauperrime ciliatus. *Corollae* tubus 2·5 mm. longus, lobi 4, 3 mm. longi, 2·5 mm. lati. *Antherae* 2·5 mm. longae, filamentis brevibus *Stylus* 4 mm. longus, glaber, ad medium bifidus.

Chiengmai, Doi Sootep, evergreen jungle, 1650 m., *Kerr*, 1749.

Knoxia brachycarpa, *R. Br.*—F.B.I., iii. p. 130.
Chiengmai, in deciduous jungle on Doi Sootep, 450 m., *Kerr*, 721.
Distr. Tropical Himalaya, Behar, Pegu, Cambodia.

Knoxia corymbosa, *Willd.*—F.B.I., iii. p. 128 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 66.
Chiengmai, in eng jungle on Doi Sootep, 300–450 m., *Kerr*, 799 : in open grassy spots on Doi Sootep, 1350 m., *Kerr*, 781.
Distr. India, Burma, China, Malaya, N. Australia.

Plectronia didyma, *Kurz*, For. Fl. Burma, ii. p. 35 ; Williams, Bull. Herb. Boiss., v. (1905) p. 953. *Canthium didymum*, Gaertn. f. —F.B.I., iii. p. 132.
Chiengmai, deciduous jungle on Doi Sootep, 300 m., *Kerr*, 1079.
Distr. India, Assam, China, Cochinchina, Malaya.

Plectronia parvifolia, *Kurz*, For. Fl. Burma, ii. p. 36. *Canthium parvifolium*, Roxb.—F.B.I., iii. p. 135.
Chiengmai, Doi Sootep, 450–1050 m., *Kerr*, 664.
Distr. India, Burma, Assam, S. China, Malaya.

Vangueria pubescens, *Kurz*, For. Fl. Burma, ii. p. 34 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 66. *V. spinosa*, Roxb., var. *mollis*, Hook. f., F.B.I., iii. p. 136.
Chiengmai, in eng jungle, 300 m., *Kerr*, 582.
Distr. Bengal, Burma, Cambodia.

Ixora amoena, *Wall.*—F.B.I., iii. p. 146 ; *non* Williams, Bull. Herb. Boiss., v. (1905) p. 954. *I. stricta*, Williams, l.c. p. 955, at least for *Schmidt*, 621a, *non* Roxb.
Lem Dan, *Schmidt*, 621a.
Distr. Malaya.

Ixora arguta, *Br.* *I. nigricans*, Br.—F.B.I., iii. p. 149, p.p. *Stylocoryne Wallichii*, K. Sch., Bot. Tidsskr., xxiv. p. 336 ; Williams, Bull. Herb. Boiss., v. (1905) p. 955, *non Webera Wallichii*, Hook. f.
Lem Dan, *Schmidt*, 800.
Distr. Malay Peninsula.

Ixora grandifolia, *Zoll. et Mor.*, var. **glabra**, *Craib*, var. nov., a typa paniculis glabris facile distinguenda.
Chiengmai, in eng. jungle on Doi Sootep, 330–600 m. *Kerr*, 530, 1706 ; Chiengmai, *Hosseus*, 178 (Herb. Kew! et Copenhagen!) ; Doi Chieng Dao, 400 m., *Hosseus*, 469.
Lao name, Dawk Kem (ex *Kerr*).
Murton, 75 enumerated by Williams under *I. stricta*, is probably also a form or variety of *I. grandifolia*.

Ixora pavettaefolia, *Craib*, comb. nov. *Mussaenda pavettaefolia*, Kurz, For. Fl. Burma, ii. p. 57 ; F.B.I., iii. p. 91. *I. debilis*, Drake, Journ. de Bot., ix. (1895) p. 234.
Chiengmai, Doi Sootep, 750 m., *Kerr*, 642.
Distr. Burma, Tonkyeghat, *Kurz*, 1409. China : Yunnan, *Henry*, 13757 ; Hainan, *Katsumatra* in Herb. Hongkong, 6714, 6717, 6718. Tonkin, *Balansa*, 2662, 2663.
The fruit of this plant has not, so far as the writer is aware, yet been collected ; until fruit is collected, it would appear advisable to follow Drake and leave it in *Ixora*, though the habit is scarcely that of an *Ixora*.

Ixora spectabilis, *Wall.*—F.B.I., iii. p. 141. *I. grandifoliae*, var.?—Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 67.

Chiengmai, 300 m., *Hosseus*, 451 (Herb. Kew! et Copenhagen!); Doi Sootep, 660 m., *Kerr*, 1800.

Distr. Burma.

Ixora stricta, *Roxb.*—F.B.I., iii. p. 145; For. Fl. Burma, ii. p. 26; Williams, Bull. Herb. Boiss., v. (1905) p. 955, pro parte. *I. amoena*, Williams, l.c. p. 954, *non* Wall.

Lem Dan, *Schmidt*, 25.

Distr. India, China, Indo-China.

Pavetta indica, *Linn.*—F.B.I., iii. p. 150. *Ixora Pavetta*, Roxb.—For. Fl. Burma, ii. p. 18.

Chiengmai, in deciduous jungle on Doi Sootep, 300–1050 m., *Kerr*, 1149, 1775; Bangkok, *Schomburgk*, 214.

Distr. India, S. China, throughout Indo-China, Malaya.

Pavetta indica, *Linn.*, var. **tomentosa**, *Hook, f.*, F.B.I., iii. p. 150. *Ixora tomentosa*, Roxb.—For. Fl. Burma, ii. p. 19.

Chiengmai, Doi Sootep, 1050 m., *Kerr*, 725; Phre, 150–240 m., *Luang Vanpruk*, 185.

Distr. India, Burma, Assam, Tonkin, Malaya.

Lao name, Khem Peh (ex *Luang Vanpruk*).

Morinda tinctoria, *Roxb.*—F.B.I., iii. p. 156; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 67.

Chiengmai, in evergreen jungle on Doi Sootep, 600–900 m., *Kerr*, 1092; Doi Sootep, 700–1000 m., *Hosseus*, 450 (Herb. Kew! et Copenhagen!); Phre, 120–180 m., *Luang Vanpruk*, 151.

Distr. Throughout India, Indo-China, Malaya.

Probably the form described as *M. leiantha*, Kurz., For. Fl. Burma, ii. p. 59.

Morinda tinctoria, *Roxb.*, var. **tomentosa**, *Hook, f.*, F.B.I., iii. p. 156. *M. tomentosa*, Heyne—For. Fl. Burma, ii. p. 60.

Chiengmai, in deciduous jungle on Doi Sootep, 420–440 m., *Kerr*, 1182, 1819; Phre, 156–210 m., *Luang Vanpruk*, 172.

Distr. India, Burma.

Prismatomeris tetrandra, *K. Schum.* *P. albidiflora*, Thw.—F.B.I., iii. p. 159. *Coffea tetrandra*, Roxb.—For. Fl. Burma, ii. p. 28.

Chiengmai, Doi Sootep, 480 m., *Kerr*, 683, 683a.

Distr. India, Burma, Assam, Cambodia, Cochinchina, Malaya.

Psychotria sp.

Chiengmai, in evergreen jungle on Doi Sootep, 900–1050 m., *Kerr*, 1123, 1188.

In the absence of fruit I hesitate to describe this as new.

Chasalia curviflora, *Thw.*—F.B.I., iii. p. 176; For. Fl. Burma, ii. p. 14; Williams, Bull. Herb. Boiss., v. (1905) p. 955.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1154.

Distr. India, throughout Indo-China, Malaya.

Cephaelis siamica, *Craib*, sp. n., a speciebus indicis adhuc descriptis foliis multo minoribus facile distinguenda.

Radix crassa, lignosa; caules lignosi, teretes, ad 52 cm. alti, primo ferrugineo-pilosi, mox glabri, cortice pallide brunneo striato obtecti. *Folia* lanceolata, apice acutiuscula, basi cuneata, 7–13 cm. longa,

2–5 cm. lata, chartacea, margine integra, supra glabra, subtus costa nervisque praecipue pilosa, nervis lateralibus utrinque 7–8 intra marginem arcuatis supra conspicuis subtus prominentibus, nervis transversis vix conspicuis ; petioli 0·5–1 cm. longi, pilosi ; stipulae deciduae. *Inflorescentia* sessilis, terminalis, densa, capitata. *Receptaculum* 1·5 mm. longum, hirsutum. *Calycis* lobi lanceolati, 3 mm. longi, 1 mm. lati, extus hirsuti. *Corolla* viridis ; tubus fere 4 mm. longus, extus fere glaber, intus fauce dense albo-villosus ; lobi deltoidei, 1·5 mm. longi, 1 mm. lati, apice duriusculi, extus apicem versus pilosi. *Stamina* fauce inserta, antheris paullo exsertis. *Ovarium* 2-loculare, ovulis solitariis erectis, disco majuscolo coronatum ; stylus 2 mm. longus, crassiusculus, styli ramis 0·5 mm. longis suberectis.

Chiengmai, Doi Sootep, in evergreen jungle, 660 m., *Kerr*, 1173.

As *Psychotria* stands at present this plant might about equally well be considered as belonging to that genus.

Lasianthus Hookeri, *C. B. Clarke ex Hook f.*, F.B.I., iii. p. 184.
Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1157.
Distr. Khasia.

Lasianthus Kerrii, *Craib*, sp. n., a *L. Wightiano*, Hook. f., ramulis appresse fulvo-hirsutis, foliis supra glabris, nervis lateralibus utrinque 5–7 tantum recedit.

Suffrutex sarmentosus, usque ad 1·2 m. altus (fide *Kerr*) ; ramuli appresse fulvo- vel juventute brunneo-hirsuti. *Folia* oblanceolata, elliptico-oblanceolata vel oblonga, apice breviter acuminata, acutiuscula, basi cuneata, obtusa vel rotundata, 5–10 cm. longa, 1·7–4 cm. lata, chartacea vel rigide chartacea, supra glabra, subtus costa nervisque hirsuta, cetera pubescentia, nervis lateralibus utrinque 5–7 supra sicco subconspicuis subtus cum nervis transversis valde prominentibus ; petioli 4–9 mm. longi ; stipulae deciduae, lineari-lanceolatae, ad 6 mm. longae, 1·5 mm. latae. *Cymae* axillares, sessiles ; bracteae parvae, subulatae. *Receptaculum* 2 mm. altum, 1·5 mm. diametro, strigillosum. *Sepala* lineari-lanceolata, acuta, 2 mm. longa, 0·75 mm. lata, extra strigillosa. *Corollae* albae tubus 7 mm. longus, extra parce hirsutus, lobi 2 mm. longi, obtusi. *Antherae* lineares, 1·5 mm. longae, filamentis brevissimis. *Ovarium* 4-loculare.

Chiengmai, Doi Sootep, in evergreen jungle, 1260 m., *Kerr*, 1501.

Lasianthus Kurzii, *Hook. f.*, F.B.I., iii. p. 183. *L. stercorarius*, Kurz, For. Fl. Burma, ii. p. 31, *non* Bl. (ex F.B.I., l.c.).
Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1122.
Distr. Burma.

Lasianthus lucidus, *Bl.*—F.B.I., iii, p. 184 ; Williams, Bull. Herb. Boiss., v. (1905) p. 955.
Doi Intanon, 2350 m., *Hosseus*, 353 (Herb. Kew ! et Copenhagen !).
Distr. Khasia, Java, Celebes.

Paederia Kerrii, *Craib*, sp. n., a *P. lanuginosa*, Wall., foliis minoribus indumento subtus vix tam denso, receptaculo hirsuto haud tomentoso, sepalis majoribus, corolla sicco nigra recedit.

Suffrutex scandens ; ramuli primo parcius hirsuti, plus minusve glabrescentes, parce lenticellati. *Folia* ovato-oblonga vel ovato-elliptica, apice acuminata, acuta, basi alte cordata, 3–12·5 cm.

longa, 1–9 cm. lata, chartacea, supra scaberula, subtus tomentella, nervis lateralibus utrinque 6–7 pagina utraque conspicuis ; petioli 0·7–3·3 cm. longi ; stipulae mediocres, ovatae vel oblongae, acutae, reflexae. *Bracteae* parvae, lanceolatae, acutae. *Receptaculum* plerumque densius hirsutum, 2 mm. altum, 2·5 mm. diametro. *Sepala* lanceolata, acutiuscula, 2 mm. longa, fere 1·5 mm. lata. *Corollae* tubus ad 1·6 cm. longus, 3·5 mm. diametro, extus parce pilosus, intus dense villosus. *Styli* glabri rami 1·3 cm. longi.

Chiengmai, 300 m., *Kerr*, 534 ; behind Ban Djam, 350–500 m., *Hosseus*, 369 (Hb. Kew ! et Copenhagen !).

Distr. Tenasserim, Thoungyen, *Beddome* ; ? Yunnan, *Henry*, 9126.

Henry's specimen is referred here doubtfully as it is in an advanced fruiting stage.

Paederia pilifera, *Hook. f.*, var. **siamensis**, *Craib*, var. nov., a typa foliis angustioribus, fructu majore, eiusque indumento crassiore, sepalis fructescentibus suberectis haud reflexis recedit.

Chiengmai, Doi Sootep, 540 m., *Kerr*, 1076.

The writer has seen only two sheets of *P. pilifera*—the type specimen in the Wallichian herbarium and one collected by Collett (*P. lanuginosa*, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 67, *non* Wall.). Both are fruiting specimens and Kerr's specimens—also in fruit—differ from the type in the rather narrower more parallel-sided leaves, the somewhat larger fruit crowned by the suberect not reflexed sepals.

Borreria stricta, *K. Sch.* *Spermacoce stricta*, Linn. f.—F.B.I., iii. p. 200.

Chiengmai, in mixed jungle at foot of Doi Sootep, 330 m., *Kerr*, 1348 ; Wang Djao, *Hosseus*, 51.

Distr. S.E. Asia, Trop. Africa, Mascerene Is.

Rubia siamensis, *Craib*, sp. n., a *R. cordifolia*, Linn., foliis semper oppositis, inflorescentiae rachi crassiore, bracteis parvis facile distinguenda.

Caules scandentes, breviter sparse aculeati. *Folia* ovata vel ovato-lanceolata, cordata, apice acuta, 6–11 cm. longa, 3–7·2 cm. lata, chartacea, utrinque costa nervisque aculeata, e basi 3–5-nervata, nervis supra conspicuis subtus prominentibus nervis secondariis obscuris vel subobscuris ; petioli ad 8 cm. longi ut in caulibus aculeati. *Paniculae* axillares, ad 30 cm. longae, bracteis parvis ; pedicelli ad 3 mm. longi. *Receptaculum* 0·5 mm. altum, 1·25 mm. latum, glabrum ; calyx obsoletus. *Corollae* viridis tubus 1·25 mm. longus, lobi lineari-lanceolati, acuti, 2 mm. longi, 1 mm. lati, intra pulverulento-pilulosi. *Discus* parvus, tumidus. *Stylus* brevis, glaber, stigmate capitato 2-lobato.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1832.

Valerianaceae.

Valeriana Hardwickii, *Wall.*—F.B.I., iii. p. 213.

Chiengmai, Doi Sootep, in open grassy jungle, 1500 m., *Kerr*, 882.

Distr. Himalayas, Burma, Yunnan, Java.

Compositae.

Vernonia bracteata, *Wall.*—F.B.I., iii. p. 232 ; Williams, Bull. Herb. Boiss., v. (1905) p. 957.
Chiengmai, Doi Sootep, 600–650 m., *Kerr*, 828a, *Hosseus*, 313a.
Distr. Himalayas, Burma, Assam.

Vernonia chinensis, *Less.*—F.B.I., iii. p. 235. *V. sinensis*, Williams, Bull. Herb. Boiss., v. (1905) p. 957.
Chiengmai, Doi Sootep, in evergreen jungle, 1200 m., *Kerr*, 789.
Distr. China, throughout Indo-China, Malaya.

Vernonia Cumingiana, *Benth.* ?
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1114.

Vernonia Curtisii, *Craib et Hutchinson*, Kew Bull., 1910, p. 22.
Kedah, Langkawi, *Curtis*, 2127, 3690.

Vernonia divergens, *Edgew.*—F.B.I., iii. p. 234 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 69.
Chiengmai, in evergreen jungle on Doi Sootep, 1200–1650 m., *Kerr*, 524.
Distr. India, Burma, Assam.

Vernonia elaeagnifolia, *DC.*—F.B.I., iii. p. 237 ; For. Fl. Burma, ii. p. 80 ; Williams, Bull. Herb. Boiss., v. (1905) p. 957.
Chiengmai, 300 m., in scrub jungle, *Kerr*, 1693 ; Bangkok, *Schomburgk*, 116, *Zimmermann*, 101 ; Chantaboon, *Murton*, 63.
Distr. Burma.

Vernonia Parishii, *Hook, f.*, F.B.I., iii. p. 240.
Chiengmai, Doi Sootep, 600–1800 m., *Hosseus*, 458.
Distr. Burma, Yunnan.

Vernonia Roxburghii, *Less.*—F.B.I., iii. p. 232.
Wang Djao, *Hosseus*, 50.
Distr. India, Burma.

Vernonia saligna, *DC.*—F.B.I., iii. p. 235.
Doi Intanon, 600 m., *Hosseus*, 328.
Distr. Nepaul, Assam, Burma, Yunnan.

Vernonia teres, *Wall.*—F.B.I., iii. p. 230.
Chiengmai, in eng jungle on Doi Sootep, 300–600 m., *Kerr*, 828.
Distr. India, Burma, Assam, Yunnan.

Vernonia volkamerifolia, *DC.*—F.B.I., iii. p. 240.
Chiengmai, Doi Sootep, 1200–1650 m., *Kerr*, 523, *Hosseus*, 227.
Distr. Sikkim, Assam, Burma.

Adenostemma viscosum, *Forst.*, var. **latifolia**, *Hook. f.*, F.B.I., iii. p. 242 ; Williams, Bull. Herb. Boiss., v. (1905) p. 957.
Chiengmai, Doi Sootep, 690–900 m., *Kerr*, 1259, 1492.
Distr. Tropics.

Ageratum conyzoides, *Linn.*—F.B.I., iii. p. 243 ; Williams, Bull. Herb. Boiss., v. (1905) p. 958.
Chiengmai, 300 m., "a garden weed," *Kerr*, 1633 ; Doi Sootep, 700 m., *Hosseus*, 483 ; Bankok, *Zimmermann*, 70.
Distr. Tropical Africa eastwards to Japan and Malay Archipelago.

Eupatorium cannabinum, *Linn.*—F.B.I., iii. p. 243.
Chiengmai, Doi Sootep, in open grassy jungle, 1500 m., *Kerr*, 1387.
Distr. Europe and Temperate Asia.

Eupatorium odoratum, *Linn.*—F.B.I., iii. p. 244; Williams, Bull. Herb. Boiss., v. (1905) p. 962.
Chiengmai, Doi Sootep, 300–720 m., *Kerr*, 924; Nakontai, 300 m., *Hosseus*, 718a; Raheng, *Lindhard*, 71.
A native of W. Indies—firmly established in Burma.

Grangea maderaspatana, *Poir.*—F.B.I., iii. p. 247; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 70.
Chieng Dao, banks of Meh Ping, 350 m., *Hosseus*, 526; Chiengmai, 300 m., *Kerr*, 1696—"a garden weed."
Distr. Tropical Asia and Africa.

Aster trinervius, Roxb.—F.B.I., iii. p. 252.
Doi Chieng Dao, 2000 m., *Hosseus*, 406.
Distr. Himalayas, Burma, Assam, China, Japan.
The Siam plant quoted is the *A. asperrimum*, Wall. Cat. 2970 in Herb. Kew.

Erigeron linifolium, *Willd.*
Chiengmai, on old clearings on Doi Sootep, 720 m., *Kerr*, 646.
Distr. Japan and Philippines to Canaries.

Conyza viscidula, *Wall.*—F.B.I., iii. p. 258.
Chiengmai, Doi Sootep, 720–900 m., *Kerr*, 1725, *Hosseus*, 306.
Distr. India, Burma, Assam, China, Malay Archipelago, Australia.

Blumea aromatica, *DC.*—F.B.I., iii. p. 270.
Chiengmai, Doi Sootep, 1650 m., *Kerr*, 1675.
Distr. Himalayas, Yunnan, Khasia, Tenasserim.

Blumea balsamifera, *DC.*—F.B.I., iii. p. 270; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71; Williams, Bull. Herb. Boiss., v. (1905) p. 958.
Muang Prow, 480 m., *Kerr*, 1037.
Distr. India, Burma, Assam, Tonkin, Malaya.

Blumea glomerata, *DC.*—F.B.I., iii. p. 262; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71; Williams, Bull. Herb. Boiss., v. (1905) p. 958.
Chiengmai, Doi Sootep, 300–700 m., *Kerr*, 940, *Hosseus*, 294.
Distr. India, Burma, Assam, S. China, Malay Archipelago, Philippines.

Blumea hieracifolia, *DC.*—F.B.I., iii. p. 263; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71.
Chiengmai to Muang Fang, 450 m., *Hosseus*, 294a.
Distr. India, Burma, China, Tonkin, Java.

Blumea Hossei, *Craib*, sp. n., ab affini *B. gracili*, Dunn, foliis acutis haud integris facile distinguenda.

Herba erecta, 25–40 cm. alta; caules solitarii, graciles, simplices, scabriduli praetereaque superne albo-pilosi. *Folia* caulis apicem versus gradatim decrescentia, sessilia, lanceolata vel oblanceolata, apice acuta, mucronata, 2·5–6 cm. longa, 0·7–1·2 cm. lata, margine irregulariter dentata dentibus induratis, rigida, supra juventute pilis albidis deciduis basi incrassatis instructa, mox partibus incrassatis persistentibus scabridula, subtus glabrescentia, primo costa nervisque

praecipue pilosa, dentibus exceptis ciliata, nervis lateralibus utrinque circiter 6 pagina superiore obscuris inferiore prominulis. *Capitula* ad caulis apicem congesta, erecta, circiter 7 mm. longa, 7 mm. lata, pedunculis brevibus suffulta. *Involucri* campanulati bracteae lineari-lanceolatae, acuminatae, acutae, exteriores gradatim minores, ciliolatae, extus pubescentes.

Chiengmai, Doi Sootep, 1050 m., *Hosseus*, 494 (Herb. Kew! et Copenhagen!).

Blumea membranacea, *DC.*, var. **subsimplex**, *Hook. f.*, F.B.I., iii. p. 265; Williams, Bull. Herb. Boiss., v. (1905) p. 962.

Chiengmai, at foot of Doi Sootep, 300 m., *Kerr*, 941.

Distr. Sikkim, Bengal, Assam, Burma.

Zimmermann's specimen from Bangkok quoted by Williams l.c. p. 958 under *B. virens* is referable rather to *B. membranacea*, and probably is the variety *subsimplex* of that species.

Blumea oxyodonta, *DC.*—F.B.I., iii. p. 266; Williams, Bull. Herb. Boiss., v. (1905) p. 958.

Ban Gao, 360 m., *Hosseus*, 384.

Distr. India, Burma, China, Philippines.

Evidently allied to this species is *Hosseus*, 482, from Doi Sootep.

Laggera alata, *Schultz-Bip.*—F.B.I., iii. p. 271; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71.

Chiengmai, in open grassy jungle on Doi Sootep, 1350 m., *Kerr*, 1688.

Distr. S.E. Asia, Trop. Africa.

Laggera flava, *Benth.*—F.B.I., iii. p. 270; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71; Williams, Bull. Herb. Boiss., v. (1905) p. 958.

Chiengmai, Doi Sootep, 300–800 m., *Kerr*, 939, *Hosseus*, 292; Raheng, *Lindhard*, 62.

Distr. India, Burma, Assam, Yunnan, Malay Peninsula.

Laggera pterodonta, *Benth.*—F.B.I., iii. p. 271; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 71.

Chiengmai, Doi Sootep, 1650 m., *Kerr*, 1676.

Distr. Trop. Asia and Africa.

Pluchea eupatorioides, *Kurz*—Williams, Bull. Herb. Boiss., v. (1905) p. 958.

Meh Kung, 420 m., *Kerr*, 1021.

Distr. Burma, Szemao (*Bons d'Arty*, 218).

Sphaeranthus indicus, *Linn.*—F.B.I., iii. p. 275; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 72.

Chiengmai, 300 m., in paddy fields, *Kerr*, 1666.

Distr. Trop. E. Asia, Africa, Australia.

Kerr's plant belongs to the form *mollis* (*Roxb.* pro sp.).

Anaphalis margaritacea, *Benth.*

Chiengmai, Doi Sootep, 1700 m., *Hosseus*, 189.

Distr. Asia, N. America.

Gnaphalium indicum, *Linn.*—F.B.I., iii. p. 289; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 72.

Chiengmai, Doi Sootep, 700–900 m., *Hosseus*, 274, 487; Chiengmai, 300 m., *Kerr*, 1671—"a garden weed."

Distr. Senegal to China and Japan and south to Australia.

Gnaphalium multiceps, *Wall.*—Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 72. *G. luteo-album*, Linn., var. *multiceps*, Hook. f., F.B.I., iii. p. 288.

Chiengmai, Doi Sootep, 660–700 m., *Kerr*, 1144, *Hosseus*, 488.

Distr. North India, Burma, Assam, China, Japan, Tonkin, Malay Archipelago.

Inula Cappa, *DC.*—F.B.I., iii. p. 295 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 72.

Chiengmai, Doi Sootep, 300–1570 m., *Kerr*, 937, *Hosseus*, 231, 289 ; Doi Chieng Dao, 2180 m., *Hosseus*, 396.

At first sight remarkably different from the Simla form, this plant is probably *I. oblonga*, DC.

Inula eupatorioides, *DC.*—F.B.I., iii. p. 295.

Doi Intanon, 1000 m., *Hosseus*, 331.

Distr. Khasia, Yunnan, Himalayas to Sikkim.

Inula nervosa, *Wall.*, var. ?

Chiengmai, in open grassy jungle on Doi Sootep, 1350–1500 m., *Kerr*, 1502.

Distr. Himalayas, Khasia, Naga Hills, Manipur.

Inula polygonata, *DC.*—F.B.I., iii. p. 293 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 72 ; Williams, Bull. Herb. Boiss., v. (1905) p. 962.

Chiengmai, Doi Sootep, 300–800 m., *Kerr*, 916, *Hosseus*, 290 ; Nakontai, *Hosseus*, 725 ; Raheng, *Lindhard*, 3.

Distr. Burma.

Inula rubricaulis, *C. B. Clarke*—F.B.I., iii. 296.

Doi Chieng Dao, 2100 m., *Hosseus*, 417.

Distr. Himalayas, Assam, Yunnan.

Inula sp.

Chiengmai, Doi Sootep, 700 m., *Hosseus*, 422.

Vicoa auriculata, *Cass.*—F.B.I., iii. p. 297 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 73.

Chiengmai, Doi Sootep, 300–600 m., *Kerr*, 930, *Hosseus*, 293.

Distr. India, Burma, Yunnan.

Xanthium strumarium, *Linn.*—F.B.I., iii. p. 303.

Muang Prow, 480 m., *Kerr*, 1039.

Distr. Tropics and subtropics.

Siegesbeckia orientalis, *Linn.*—F.B.I., iii. p. 304.

Chiengmai, by a temple on waste ground on Doi Sootep, 1020 m., *Kerr*, 863.

Distr. Tropics and subtropics.

Enhydra fluctuans, *Lour.*—F.B.I., iii. p. 304 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 73.

Bangkok, *Zimmermann*, 98 ; Chiengmai, 300 m., *Kerr*, 1667.

Distr. S. E. Asia, Australia, Tropical Africa.

Bidens pilosa, *Linn.*— F.B.I., iii. p. 309.

Chiengmai, Doi Sootep, in open grassy spots, 720 m., *Kerr*, 743.

Distr. Cosmopolitan in warm regions.

The plant quoted by Collet and Hemsley, Journ. Linn. Soc., xxviii. p. 74, as *Bidens pilosa*, var. is *Glossogyne tenuifolia*, Cass.

Gynura pseudo-china, *DC.*—F.B.I., iii. p. 334 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 74.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 1802.
Distr. India, Burma, Malaya.

Emilia angustifolia, *DC. E. prenanthoidea*, DC.—F.B.I., iii. p. 336.
Chiengmai, Doi Sootep, 700–1050 m., *Kerr*, 1118, *Hosseus*, 269, 489.
Distr. Sikkim, Assam, Yunnan, Philippines.

Senecio Craibiana, *Hosseus.*
Doi Chieng Dao, 1800–2200 m., *Hosseus*, 395 (Herb. Kew ! Hoss. ! Copenhagen !).

Senecio nagensium, *C. B. Clarke*, var. **Lobbii,** *Craib. S. densiflorus*, Wall., var. *Lobbii*, Hook. f., F.B.I., iii. p. 355.
Chiengmai, Doi Sootep, 960 m., *Kerr*, 952 ; Doi Chieng Dao, 1160 m., *Hosseus*, 397 ; Doi Intanon, 1180 m., *Hosseus*, 335.
Distr. Burma.
This plant may eventually prove to be a rayed state of *S. nagensium.* To the writer, the plant referred to this species by Collett and Hemsley, Journ. Linn. Soc., xxviii. p. 75, appears distinct, its leaves being rounded not cuneate at the base and the serrations being much finer.

Senecio triligulatus, *Ham.*—F.B.I., iii. p. 356.
Chiengmai, Doi Sootep, in evergreen jungle, 1650 m., *Kerr*, 1679.
Distr. E. Himalayas, Burma, Yunnan.

Saussurea phyllocephala, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 76.
Chiengmai, Doi Sootep, 1350–1570 m., *Kerr*, 1642, *Hosseus*, 230.
Distr. Upper Burma.

Tricholepis karensium, *Kurz*—F.B.I., iii. p. 380.
Chiengmai, Doi Sootep, in open jungle, 1350–1500 m., *Kerr*, 1641.
Distr. Karren, Tenasserim, Yunnan.

Leucomeris decora, *Kurz*, For. Fl. Burma, ii. p. 78; F.B.I., iii. p. 387 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 77.
Chiengmai, Doi Sootep, 1380 m., *Kerr*, 601 ; Phre, 156–240 m., *Luang Vanpruk*, 113.
Distr. Burma, Yunnan.

Ainsliæa pteropoda, *DC.*—F.B.I., iii. p. 388.
Doi Intanon, 2565 m., *Hosseus*, 358a.
Distr. Himalayas, Assam, Burma, Yunnan.
The Shan Hill plant quoted by Collett and Hemsley, Journ. Linn. Soc., xxviii. p. 77, under this species is a much more robust plant, and is C. B. Clarke's *A. silhetensis* which that author afterwards regarded as a variety of *A. pteropoda.*

Pertya Hossei, *Craib*, sp. n., a *P. scandente*, Sch. Bip., foliis rigidioribus, capitulis paulo longioribus, a *P. ovata*, Maxim., ramulis glabris, foliis minoribus, capitulis longioribus angustioribus, involucri bracteis paucioribus recedit.
Suffrutex 1·5 m. altus (*ex Hosseo*); ramuli graciles, angulati, glabri, cortice cinereo-brunneo. *Folia* alterna, ovato-lanceolata vel

ovata, apice acuta, basi cuneata, 1·5–3·3 cm. longa, 1–2 cm. lata, subcoriacea vel rigide chartacea, glabra nisi margine ciliolata, distanter pauci-serrata, trinervata, nervis supra conspicuis subtus prominulis; petioli breves. *Capitula* pluriflora, 2·3 cm. longa; involucri bracteae circiter 6-seriatae, exteriores parvae ovatae, interiores lineari-oblongae, obtusae, rigidae, glabrae. *Corollae* tubus 1 cm. longus, superne ampliatus, lobi anguste lineari-lanceolati, apice revoluti, 0·5 cm. longi. *Antherae* circiter 0·5 cm. longae, basi caudis 2 mm. longis ciliatis instructae. *Achaenia* vix matura, pilosula, costata.

Doi Chieng Dao, 2100 m., *Hosseus*, 405 (Herb. Kew! et Copenhagen!).

Gerbera piloselloides, *Cass.*—F.B.I., iii. p. 389; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 77.

Chiengmai, on tops of ridges in open jungle on Doi Sootep, 1350–1500 m., *Kerr*, 621.

Distr. N. India, China, Trop. and S. Africa, Mascerene Islands.

Crepis acaulis, *Hook. f.*, F.B.I., iii. p. 396; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 78.

Chiengmai, 300 m., *Hosseus*, 442; Doi Sootep, 720 m., *Kerr*, 1727.

Distr. India, Burma, Assam, Yunnan.

Crepis chloroclada, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 78.

Chiengmai, in open grassy jungle on Doi Sootep, 1200–1500 m., *Kerr*, 1108.

Distr. Upper Burma, Yunnan.

Crepis japonica, *Benth.*—F.B.I., iii. p. 395; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 78.

Muang Fang, 300 m., *Hosseus*, 615.

Distr. Japan south to Australia and west to Afghanistan and S. Africa.

Lactuca Parishii, *Craib*, sp. n., ab affini *L. alatipidi*, Coll. et Hemsl., foliorum lobis numerosioribus, lobo terminali basi fere recto marginibus rectis vel nonnihil concavis sed nunquam convexis, lobis lateralibus a lobo terminali haud tam distantibus, achæniorum rostris multo brevioribus recedit.

Herba glabra, robusta, 12 dm. vel ultra alta. *Folia* caulina inferiora petiolo 7–12 cm. longo alato suffulta, pinnatisecta, 14–31 cm. longa, lobo terminali deltoideo acuto 9–14 cm. longo 7–11 cm. lato, lobis lateralibus utrinque 2–4 supremis a lobo terminali nunquam ultra 1 cm. distantibus plerumque lanceolatis acutis 2–5 cm. longis 1·2–2·5 cm. latis, rachi inter lobos alata, membranacea, margine irregulariter lobata et praeterea distanter denticulata. *Capitula* laxe paniculata, erecta, circiter 12-flora, vix 1·5 cm. longitudinis attingentia. *Achaenia* compressa, 0·5 cm. alta, apice in rostrum 1 mm. longum attenuata, faciebus circa 5-costata, costis superne praecipue pilis brevibus rigidis scabridula.

Burma, Moulmein, 1200–1500 m., *Parish*, 423.

Chiengmai, Doi Sootep, 600–1000 m., *Hosseus*, 454 (Herb. Kew! et Hoss.!), *Kerr*, 1683.

Campanulaceae.

Pratia begonifolia, *Lindl.*—F.B.I., iii. p. 422 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 80.

Chiengmai, Doi Sootep, 1350 m., *Kerr*, 706.

Distr. S.E. Asia.

Lobelia affinis, *Wall.*—F.B.I., iii. p. 424.

Chiengmai, Doi Sootep, 900–1050 m., *Hosseus*, 497, *Kerr*, 1756.

Distr. India, Burma, Assam, S. China, Malaya.

Lobelia Griffithii, *Hook. f. et Th.*, var. **dopatrioides**, *Kurz*, Journ. As. Soc. Beng., xlvi. p. 211. *L. Griffithii*, Hook. f. et Th.—F.B.I., iii. p. 424, pro parte.

Chiengmai, Doi Sootep, 330 m., *Kerr*, 1466.

Distr. Burma.

Closely allied to this plant is *Hosseus*, 462 from Doi Chieng Dao.

Lobelia terminalis, *C. B. Clarke*, F.B.I., iii. p. 424.

Chiengmai, Doi Sootep, 800 m., *Hosseus*, 268.

Distr. N. Bengal.

Lobelia trialata, *Ham.*—F.B.I., iii. p. 425.

Chiengmai, Doi Sootep, in open jungle, 660–1350 m., *Kerr*, 1517.

Distr. N. India, Burma, Assam, Java.

Campanumaea celebica, *Blume*—F.B.I., iii. p. 436.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1217.

Distr. Himalayas, Burma, Borneo.

Campanumaea cordata, *Maxim.* *Codonopsis cordata*, Hassk., Retzia, i. p. 9.

Chiengmai, in evergreen and open jungle on Doi Sootep, 900–1200 m., *Kerr*, 1371.

Distr. Java, Sumatra.

I have seen neither Hasskarl's original plant nor the type of *C. javanica*, Bl. Kerr's plant agrees with a plant collected by Teysmann and named *C. cordata* by Miquel, which plant however Koorders regards as *C. javanica*, Blume.

Vacciniaceae.

Agapetes Hosseana, *Diels*, Fedde Rep. Nov. Sp., i. p. 16 ; Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 507.

Chiengmai, Doi Sootep, 1350–1650 m., *Hosseus*, 219, *Kerr*, 514 ; Doi Intanon, 2550 m., *Hosseus*, 351 ; Doi Chieng Dao, 2180 m., *Hosseus*, 393.

Lao name, Dog Ga fag, (ex *Hosseo*, l.c.).

Karen name, Lonuteho, (ex *Hosseo*, l.c.).

Vaccinium exaristatum, *Kurz*—For. Fl. Burma, ii. p. 91 ; Coll et Hemsl., Journ. Linn. Soc., xxviii. p. 81. *V. bancanum*, C. B. Clarke, F.B.I., iii. p. 454, pro parte, *non* Miq. *V. Donianum*, Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 506 (at least for *Hosseus*, 425), *non* Wight.

Chiengmai, Doi Sootep, 700–1350 m., *Kerr*, 541, *Hosseus*, 425 ; Phre, 156–240 m., *Luang Vanpruk*, 114.

Distr. Burma, Manipur.

Closely allied to this species is *Hosseus*, 204 from Doi Sootep (*V. Leschenaultii*, Hosseus, l.c., p. 506, *non* Wight), and also *V. mandarinorum*, Diels, from China.

Ericaceae.

Rhododendron moulmainense, *Hook. f.*—F.B.I., iii. p. 463. *R. siamensis*, Diels, Fedde Rep. Nov. Sp., iv. p. 289; Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 506.
Chiengmai, Doi Sootep, 1500 m., *Hosseus*, 507.
Distr. Moulmein

Rhododendron oxyphyllum, *Franchet.*
Chiengmai, common in evergreen jungle on Doi Sootep, 900–1350 m., *Kerr*, 539.
Distr. Yunnan.
Very close to and probably not specifically distinct from *R. moulmainense*, Hook. and *R. Westlandii*, Hemsl.

Rhododendron Veitchianum, *Hook. f.* — F.B.I., iii. p. 474. *R. formosum*, Wall., var. *Veitchianum*, Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 505.
Chiengmai, common in evergreen jungle on Doi Sootep, 1350–1650 m., *Kerr*, 512, *Hosseus*, 201.
Distr. Burma, Manipur.

Rhododendron Ludwigianum, *Hosseus.*
Doi Chieng Dao, 2180 m., *Hosseus*, 401.

Pieris ovalifolia, *D. Don*—F.B.I., iii. p. 460; Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 506. *Andromeda ovalifolia*, Wall.—For. Fl. Burma, ii. p. 92.
Chiengmai, Doi Sootep, 1350–1650 m., *Kerr*, 674, *Hosseus*, 533a.
Distr. Himalayas, Burma, Assam, China, Japan.

Craibiodendron shanicum, *W. W. Smith*, Rec. Bot. Surv. Ind., iv. p. 277.
Chiengmai, Doi Sootep, 360–840 m., *Kerr*, 1282, 1282a, 1369.
Distr. Burma, Yunnan.

Monotropaceae.

Hypopithys lanuginosa, *Nutt.*—F.B.I., iii. p. 476.
Chiengmai, Doi Sootep, in evergreen jungle, 1230 m., *Kerr*, 678.
Distr. Himalayas, Khasia, China, Japan, N. America, Mexico.

Plumbaginaceae.

Ceratostigma asperrimum, *Stapf ex Prain*, Journ. Bot., (1906) p. 6. *C. plumbaginoides*, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 81., *non* Bunge.
Doi Chieng Dao, 1900 m., *Hosseus*, 398, pro parte.
Distr. Shan Hills.

Ceratostigma Stapfianum, *Hosseus.*
Doi Chieng Dao, 1900 m., *Hosseus*, 398, pro parte.

Plumbago zeylanica, *Linn.*—F.B.I., iii. p. 480.
Chiengmai, 330 m., *Kerr*, 1704.
Distr. Tropics.

Primulaceae.

Lysimachia japonica, *Thunb.*—F.B.I., iii. p. 505.
Chiengmai, in marshy ground on Doi Sootep, 660 m., *Kerr*, 1146.
Distr. Himalayas to Japan and southwards to Australia.
Kerr's plant belongs to the form *L. debilis*, Wall.

Lysimachia peduncularis, *Wall.*—F.B.I., iii. p. 504.
Chiengmai, Doi Sootep, 420 m., *Kerr*, 1457.
Distr. Upper Burma.

Myrsinaceae.

Maesa montana, *DC.*—Mez, Engler Pflanzenr., Myrsin., p. 28.
Chiengmai, in evergreen jungle on Doi Sootep, 1050 m., *Kerr*, 954, 1110.
Distr. E. Himalayas, Burma, Assam.

Maesa permollis, *Kurz*—Mez, Engler Pflanzenr., Myrsin., p. 51. *M. mollissima*, Kurz, For. Fl. Burma, ii. p. 66, *non* DC. *M. mollis*, C. B. Clarke, F.B.I., iii. p. 510 pro parte, *non* DC.
Chiengmai, in dense evergreen jungle on Doi Sootep, 1650 m., *Kerr*, 1677.
Distr. Yunnan, Upper Burma.

Maesa ramentacea, *DC.*—F.B.I., iii. p. 508; For. Fl. Burma, ii. p. 99; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 81; Williams, Bull. Herb. Boiss., v. (1905) p. 226; Mez, Engler Pflanzenr., Myrsin., p. 27.
Chiengmai, Doi Sootep, 330–900 m., *Kerr*, 519, 526, *Hosseus*, 281; Phre, Hooey Kong Muang, 240 m., *Luang Vanpruk*, 219.
Distr. S.E. Asia (excl. Philippines).

Embelia pulchella, *Mez*, Engler Pflanzenr., Myrsin., p. 324.
Chiengmai, a woody climber in evergreen jungle on Doi Sootep, 1650 m., *Kerr*, 1687.
Distr. Manipur.
The writer has failed to trace in Herb. Kew any of *Griffiths'* 3545 which he could refer to *Watt* 7277 from Manipur. Consequently the type of Mez's species has been taken as *Watt* 7277 (♀). *Kerr's* plant quoted above is ♂ and has the calyx lobes exactly as in Watt's plant, and not as described and figured by Mez.

Embelia sootepensis, *Craib*, sp. n., ab *E. robusta*, Roxb., foliis dentatis facile distinguenda.

Ramuli graciles, juventute parce pilosi, mox fere glabri, cortice cinereo-brunneo obtecti. *Folia* oblanceolata vel elliptico-oblanceolata, apice acuminata, acuta, basi cuneata, 8–15 cm. longa, 2·5–6 cm. lata, membranacea vel tenuiter chartacea, parte basali excepta dentata, supra pilosula, subtus costa nervisque puberula, nervis lateralibus utrinque 6–8 intra marginem arcuatis supra conspicuis subtus prominulis; petioli 1–1·5 cm. longi, supra canaliculati, puberuli. *Racemi* simplices, axillares, solitarii, ad 3 cm. longi, pedunculo brevi suffulti; pedicelli 2 mm. longi, ut in rachi glanduloso-puberuli; bracteae filiformes, circiter 1 mm. longae. *Calycis* lobi lanceolati, acuti, 1 mm. longi, 0·5 mm. lati, dorso glanduloso-puberuli, ciliati, pauci-punctati. *Corollae* segmenta lanceolata, acutiuscula, 2·75 mm. longa, 1 mm. lata, extra glabra, intra papillosa, pauci-punctata. *Stamina* corollam aequantia, antheris dorso punctatis.
Chiengmai, in mixed jungle on Doi Sootep, 330 m., *Kerr*, 1355.

Embelia stricta, *Craib*, sp. n., *E. sessiliflorae*, Kurz, valde affinis sed floribus fructibusque sessilibus, floribus majoribus in paniculas terminales rigidiores minus ramosas parcius puberulas dispositis differt.

Suffrutex scandens ; ramuli primo parce puberuli, mox glabi, cortice rubro-brunneo irregulariter fisso obtecti. *Folia* oblongo-elliptica, apice obscure acuminata, obtusa, basi obtusa vel rotundata, 3·5–9·5 cm. longa, 1·2–4·7 cm. lata, rigide chartacea, utrinque glabra, supra nitida, subtus pallidiora, haud nitida, nervis lateralibus utrinque numerosis subparallelis obliquis pagina utraque conspicuis ; petioli 0·8–1 cm. longi, irregulariter alati. *Spicae* et solitariae axillares et in paniculas terminales dispositae, rigidiusculae, strictae, ad 9 cm. longae, rachi puberula ; bracteae deciduae, linearilanceolatae, acutae, 3 mm. longae, patentes vel reflexae. *Calyx* fere ad basin 5-partitus, 1·75 mm. altus, segmentis deltoideis late acutiusculis 1 mm. latis extra puberulis ciliatis. *Petala* viridia, oblongo-elliptica, 2·75 mm. longa, 1·5 mm. lata. *Antherae* parvae, filamentis ad $\frac{1}{3}$ longitudinis affixis. *Ovarium* glabrum, stylo brevi, stigmate discoideo. *Fructus* globosus, apiculatus, 5 mm. diametro.

Chiengmai, Doi Sootep, 1650 m., *Kerr*, 1753.

Embelia villosa, *Wall.* *E. robusta*, C. B. Clarke, F.B.I., iii. p. 515, pro parte.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1212.

Distr. Bengal, Burma.

Kerr's plant may belong to the form *reticulata* (Wall. et Mez pro sp.), but in view of the poor material available the writer does not feel justified in maintaining both species.

Ardisia andamanica, *Kurz*?—F.B.I., iii. p. 521 ; For. Fl. Burma, ii. p. 108.

Koh Klone, *Murton*, 10 ; Kow Chang Nun, *Murton*, 22.

Distr. Andamans, Malay Peninsula.

Ardisia arborescens, *Wall.* *A. humilis*, DC., var. *arborescens*, C. B. Clarke, F.B.I., iii. p. 530.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 565.

Distr. Burma (*Collett*), Chota Nagpur (*C. B. Clarke*).

Ardisia corymbifera, *Mez*, Engler Pflanzenr., Myrsin., p. 149.

Chiengmai, growing to a height of about 1·2 m., flowers pink, spotted finely with purple, in evergreen jungle on Doi Sootep, 1500–1650 m., *Kerr*, 600, 1815.

Distr. Yunnan.

Ardisia Kerrii, *Craib.*, sp. n., ab affini *A. yunnanensi*, Mez, foliis oblanceolatis vel obovato-oblanceolatis apice abrupte acuminatis, indumento vix tam denso magis cito deciduo, floribus minoribus differt.

Arbor 4·5–7·5 m. alta (*ex Kerr*) ; ramuli validi, primo ferrugineo-tomentelli, mox glabrescentes, cortice cinereo obtecti. *Folia* oblanceolata vel obovate-oblanceolata, apice abrupte breviter acuminata, acutiuscula, basi cuneata, 4·5–13 cm. longa, 2·2–5·2 cm. lata, chartacea, supra fusco-viridia, subtus pallidiora, utrinque glabra, subtus lepidibus minutis ferrugineis instructa, nervis lateralibus utrinque numerosis parallelis supra conspicuis subtus prominulis, costa supra sicco impressa ; petioli 8 mm. longi. *Inflorescentia* submultiflora, e corymbis pinnatim dispositis constituta, foliis brevior ;

pedicelli graciles, 7–8 mm. longi. *Calycis* lobi deltoidei, subacuti, 0·75 mm. longi, 1 mm. lati, ciliolati. *Corollae* tubus brevis, lobi oblongi, subacuti, 2 mm. longi, fere 1·5 mm. lati, glabri. *Stamina* corollae subaequalia, antheris acuminatis. *Stylus* porrectus, ante anthesin exsertus.

Chiengmai, in evergreen jungle on Doi Sootep, 600–660 m., *Kerr*, 668, 1216.

Ardisia maculosa, *Mez*, Engler Pflanzenr., Myrsin., p. 143.

Chiengmai, a thin bush about 1·5 m. high, flowers purple, in evergreen jungle on Doi Sootep, 900 m., *Kerr* 699.

Distr. Yunnan.

Ardisia vestita, *Wall.* *A. villosa*, Roxb.—F.B.I., iii. p. 525; For. Fl. Burma, ii. p. 113.

Chiengmai, Doi Sootep, in evergreen jungle, 720–900 m., *Kerr*, 667.

Distr. Hainan, Yunnan, Malaya.

Ebenaceae.

Maba buxifolia, *Pers.*—F.B.I., iii. p. 551; For. Fl. Burma, ii. p. 139; Williams, Bull. Herb. Boiss., v. (1905) p. 227.

Chiengmai, Doi Sootep, in deciduous jungle, 540 m., *Kerr*, 594, 1134.

Distr. S.E. Asia, Australia, Trop. Africa.

Diospyros ehretioides, *Wall.*—F.B.I., iii. 559; For. Fl. Burma, ii. p. 129.

Chiengmai, in deciduous jungle on Doi Sootep, 300–540 m., *Kerr*, 577, 1147.

Distr. Burma.

/ **Diospyros Kerrii,** *Craib*, sp. n., *D. Packmanni*, C. B. Clarke, habitu similis sed calycis haud ferruginei lobis fere e basi liberis facile distinguenda.

Arbor 9 m. alta (*ex Kerr*); ramuli primo dense appresse ferrugineo-hirsuti, plus minusve glabrescentes. *Folia* lanceolata vel oblongo-lanceolata, apice acuminata, subacuta, basi cuneata vel rotundata, 4–10·5 cm. longa, 2–4 cm. lata, rigide chartacea, margine integra, supra juventute costa tantum pubescentia, mox omnino glabra, subtus costa indumento ut in ramulis novellis, nervis lateralibus utrinque circiter 8 intra marginem arcuatis pagina utraque juventute conspicuis mox fere obscuris; petioli circiter 5 mm. longi, indumento ramulorum. *Cymae* ♂ axillares, pauciflorae, pedunculo communi vix 1 cm. longo indumento ut in ramulis suffultae. *Calycis* segmenta 4, subrotundata, 3 mm. longa, 2·75 mm. lata, extus appresse albo-pubescentia, intus glabra. *Corolla* urceolata, extus ut in calyce pubescens, intus superne albo-pilosa; tubus 3·5 mm. longus; lobi 4, lanceolati, acutiusculi, sub anthesin recurvi, circa 4 mm. longi, 2 mm. lati. *Antherae* geminae, 14, acuminatae, filamento communi 1 mm. longo glabro, filamentis partialibus 1–1·75 mm. longis parce albo-hirsutis. *Ovarii* rudimentum parvum, subglobosum, apice pilis paucis albis ornatum.

Chiengmai, Doi Sootep, in evergreen jungle, 660 m., *Kerr*, 1090.

Diospyros mollis, *Griffith*, Journ. Agric. Hortic. Soc. Ind., iii. (1844) p. 145.
Chiengmai (ex *Griffith*, l.c.).
Distr. Burma.

Diospyros Packmanni, *C. B. Clarke*, F.B.I., iii. p. 564.
Chiengmai, 300 m., *Kerr*, 1818 ; Bangkok, *Murton*, 12, *Zimmermann*, 172—often cultivated.
Distr. Tavoy.
Lao name, M'Chunn (ex *Kerr*).

Diospyros rhodocalyx, *Kurz*, For. Fl. Burma, ii. p. 133.
Siam (ex *Kurz*, l.c.).

Diospyros siamensis, *Hochr.*, Pl. Bog. Exsicc., No. 73.
Very closely allied to *D. Embryopteris*, Pers. *Schomburgk*, 115, which Williams erroneously states "was not kept," is also allied.

Diospyros variegata, *Kurz*—F.B.I., iii. p. 557 ; For. Fl. Burma, ii. p. 137.
Chiengmai, in evergreen jungle on Doi Sootep, 660–720 m., *Kerr*, 1132, 1789.
Distr. Burma, Assam.

Styracaceae.

Symplocos adenophylla, *Wall.*—F.B.I., iii. p. 575.
Kedah, (ex Mat. Mal. Pen., 17, p. 241).
Distr. Malaya.

Symplocos racemosa, *Roxb.*—F.B.I., iii. p. 576 ; For. Fl. Burma, ii. p. 144 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 83.
Chiengmai, Doi Sootep, 540–600 m., *Kerr*, 928, 1767, *Hosseus*, 311.
Distr. Himalayas, Burma, Assam.

Symplocos spicata, *Roxb.*, var. **attenuata**, *C. B. Clarke*, F.B.I., iii. p. 573.
Kedah, (ex Mat. Mal. Pen., 17, p. 238).
Distr. Assam, Burma.

Symplocos yunnanensis, *Brand*, Engler Planzenr., Symploc., p. 68.
Chiengmai, in evergreen jungle on Doi Sootep, 1650 m., *Kerr*, 1507.
Distr. Yunnan.

Symplocos sp. *S. racemosae* et *S. pirifoliae* habitu similis.
Chiengmai, Doi Sootep, 1020 m., *Kerr*, 890.

Styrax benzoin, *Dryand*—F.B.I., iii. p. 589.
Chiengmai, Doi Sootep, 1050–1350 m., *Kerr*, 669.
Distr. Malaya.

Oleaceae.

Jasminum arborescens, *Roxb.*, var. **latifolia**, *C. B. Clarke*, F.B.I., iii. p. 594 ?
Chiengmai, in scrub jungle, 330 m., *Kerr*, 1659.
Distr. Himalayas.

Jasminum decussatum, *Wall.*—F.B.I., iii. p. 596 ; For. Fl. Burma, ii. p. 151.
Bangkok, *Zimmermann*, 9
Distr. Burma.

Jasminum Maingayi, *C. B. Clarke*, var. **kedahensis**, *King et Gamble*, Mat. Mal. Pen. 17, p. 258.

Kedah, (ex Mat. Mal. Pen., l.c.).

Jasminum sootepense, *Craib*, sp. n., *J. auriculato*, Vahl et *J. brevilobo*, DC., similis, ab illo inflorescentia pauperrima, ab hoc cymis haud capitatis distincta.

Suffrutex sarmentosus, circiter 6 dm. altus (ex *Kerr*); ramuli graciles, primo densius molliter puberuli ; rami fere glabri, cortice rubro-brunneo striato obtecti. *Folia* simplicia, ovato-rotundata, ovata vel rarissime ovato-lanceolata, apice plerumque breviter acuminata, mucronulata, basi rotundata vel obtusa, 2–4 cm. longa, 1·6–3 cm. lata, chartacea, utrinque, subtus densius, molliter puberula, nervis lateralibus utrinque circiter 4 intra marginem arcuatis supra subconspicuis subtus prominulis, nervis transversis haud conspicuis ; petioli 2–4 mm. longi, indumento ut in ramulis. *Flores* axillares, solitarii vel in cymas simplices 3-flores dispositi, albi, nocte expansi (ex *Kerr*) ; bracteae minutae ; pedicelli 5–7 mm. longi, parce puberuli. *Calycis* tubus circiter 2·5 mm. longus, extus glaber, dentes late triangulares, parvi, ciliolati. *Corallae* tubus gracilis, 1·8 cm. longus, lobi lineares, apice acuti vel breviter acuminati, circiter 1 cm. longi, 2 mm. lati. *Antherae* 5 mm. longae, apice acuminatae, filamentis brevibus. *Ovarium* vix 1 mm. altum, glabrum.

Chiengmai, in deciduous jungle on Doi Sootep, 360 m., *Kerr*, 1235.

Nyctanthes Arbor-tristis, *Linn.*—F.B.I., iii. p. 603 ; For. Fl. Burma, ii. p. 155.

Bangkok, *Zimmermann*, 87.

Cultivated in tropics.

Linociera caudata, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 84.

Meh Ping, Chieng Dao, 390 m., in evergreen jungle, *Kerr*, 1058 ; Me Sangon Phre, 240 m., *Luang Vanpruk*, 238.

Distr. Upper Burma.

Differs from the type specimens in having the leaves obtusely caudate acuminate.

Linociera macrophylla, *Wall.*, var. **attenuata**, *C. B. Clarke*, F.B.I., iii. p. 611. *Chionanthus macrophyllus*, Kurz, For. Fl. Burma, ii. p. 159.

Chiengmai, Doi Sootep, 480 m., *Kerr*, 1142 ; Phre, 156–240 m., *Luang Vanpruk*, 111.

Distr. Burma, Malaya, Australia.

Linociera pauciflora, *C. B. Clarke*, F.B.I., iii. p. 609. *Chionanthus palembanica*, Miq.—For. Fl. Burma, ii. p. 159.

Kedah, (ex Mat. Mal. Pen., 17, p. 267).

Distr. Burma, Malaya.

Olea dentata, *Wall.*—F.B.I., iii. p. 613 ; For. Fl. Burma, ii. p. 157.

Chiengmai, Doi Sootep, on edge of a clearing, 720 m., *Kerr*, 690.

Distr. Burma, Malay Peninsula.

Olea oblanceolata, *Craib*, sp. n., affinis *O. roseae*, Craib, sed foliis oblanceolatis serratis vel denticulato-serratis differt.

Arbuscula ad 6 m. alta (ex *Kerr*); ramuli primo parce pubescentes, mox glabri, cortice cinereo-brunneo obtecti, ad 4 mm. diametro.

Folia plerumque oblanceolata, apice acuminata, acutiuscula, basi cuneata, 8–14·5 cm. longa, 2–4·5 cm. lata, chartacea, supra primo parce pubescentia, mox glabra, subtus plus minusve persistenter molliter pubescentia, margine nisi ima basi acumineque serrata vel denticulato-serrata, nervis lateralibus utrinque 8–9 intra marginem arcuatis supra subobscuris mox cum costa leviter impressis subtus cum costa prominentibus, nervis transversis subobscuris ; petioli 3–8 mm. longi, primo pubescentes, mox glabri, supra canaliculati. *Paniculae* axillares, ad 9 cm. longae et 5 cm. latae, rhachi ramulisque parce pubescentibus ; pedicelli ad 2 mm. longi. *Calyx* vix 1 mm. altus, ad medium lobatus, lobis subaequalibus ovato-lanceolatis subacutis. *Corolla* 3 mm. longa, basi 0·75 mm., superne 2 mm. diametro, lobis brevibus incrassatis cucullatis. *Antherae* 1·5 mm. longae. *Ovarii* rudimentum deficiens. *Flores* ♀ haud visi.

Chiengmai, Doi Sootep, in evergreen jungle, 660 m., *Kerr*, 1717.

✓ **Olea rosea**, *Craib*, sp. n., ab affini *O. dioica*, Roxb., ramulis, foliis et inflorescentia haud glabris facile distinguenda.

Arbuscula dioica, ad 4 m. alta ; ramuli primo dense molliter puberuli, straminei. *Folia* lanceolata vel oblongo-lanceolata, apice acuminata vel caudato-acuminata, basi cuneata, 4–13·5 cm. longa, 1·6–4·2 cm. lata, rigide chartacea, margine integro, supra plus minusve glabrescentia, subtus, costa nervisque densius, molliter puberula, nervis lateralibus utrinque 6–8 intra marginem arcuatis supra impressis - subtus prominentibus, nervis transversis vix conspicuis ; petioli usque ad 7 mm. longi, ut in ramulis puberuli. *Flores* sicco rosei, in paniculas terminales geminas vel axillares solitarias dispositi. *Fl.* ♀. *Calyx* parvus, fere ad medium lobatus, extus parce puberulus. *Corollae* tubus circiter 3·5 mm. longus, dentes breves, cucullati. *Stamina* (an omnino sterilia ?) duo, corollae tubo adnata. *Ovarium* oblongum, glabrum, stylo brevi. *Fl.* ♂. *Calyx* et *corolla* maritae sed minores. *Ovarii* rudimentum deficiens.

Chiengmai, Doi Sootep, 900–1000 m., *Hosseus*, 515a (♀) (Herb. Kew et Hossei !), *Kerr*, 1100 (♂), 1843 (♀).

Distr. Yunnan, Szemao, 1500 m., *Henry*, 11661e (♂).

Henry 11661b and 11661a (in part) from the same locality probably also belong.

Apocynaceae.

Allamanda cathartica, *Linn.*
Bangkok, *Zimmermann*, 49.
Distr. Native of Trop. America—cultivated in Tropics.

Leuconotis eugenifolius, *DC.*—F.B.I., iii. p. 628.
Kedah, *Cantley*, 230.
Distr. Malaya.

Willughbeia firma, *Blume*—F.B.I., iii. p. 624.
Kedah, Langkawi, (ex Mat. Mal. Pen., 19, p. 395).
Distr. Malaya.

✓ **Melodinus Henryi**, *Craib*, sp. n., ab affini *M. khasiana*, Hook. f., foliis multo majoribus facile distinguenda.

Frutex scandens ; ramuli novelli olivacei, minute parcissime pilulosi ; rami cortice brunneo striato obtecti. *Folia* opposita vel rarissime subopposita, elliptica, oblonga vel oblanceolata, apice

acuminata, subacuta, basi cuneata, 6–16 cm. longa, 2·5–6 cm. lata, chartacea, utrinque glabra, margine integra, nervis lateralibus utrinque numerosis intra marginem arcuatis pagina utraque conspicuis ; petioli ad 8 mm. longi. *Cymae* in paniculas terminales trichotomas dispositae ; bracteae bracteolaeque parvae ; pedicelli breves. *Sepala* rotundata vel late elliptica, 2 mm. longa, ciliata. *Corollae* flavidae tubus 6 mm. longus, basi excepta intra, superne densius, villosus, apice squamis majusculis bifidis instructus, lobi 3·5 mm. longi. *Stamina* paulo infra medium inserta, filamentis brevibus. *Stylus* 3 mm. longus, cum ovario glaber.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1159.

Distr. Yunnan, Szemao, 1200–1500 m., *Henry*, 11,944, 11,944a, 12,725. Burma, Amherst, 600 m., *Lace*, 4760.

Lace's plant differs from the others in its larger leaves which measure up to 22 cm. long and 8 cm. broad.

Rauwolfia peguana, *Hook. f.*, F.B.I., iii. p. 632 ? ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 85. *Tabernaemontana ophiorrhizoides*, Kurz, For. Fl. Burma, ii. p. 175 (ex *Brandis*).

Chiengmai, Doi Sootep, in evergreen jungle, 660 m., *Kerr*, 1136.

Distr. Burma.

Carissa Carandas, *Linn.*—F.B.I., iii. p. 630 ; For. Fl. Burma, ii. p. 169.

Meh Ping, Doi Noi, 300 m., *Kerr*, 2009.

Distr. India, Burma, Malaya.

Alyxia lucida, *Wall.*—F.B.I., iii. p. 635.

Kedah, Gunong Raya, (ex Mat. Mal. Pen., 19, p. 418).

Distr. Malaya.

Alyxia pumila, *Hook. f.*—F.B.I., iii. p. 635.

Kedah, Gunong Jerai, (ex Mat. Mal. Pen., 19, p. 420).

√ **Alyxia siamensis**, *Craib*, sp. n., ab *A. gracili*, Wall., inflorescentia vix glabra recedit.

Frutex vagans, inflorescentia excepta glaber, cortice lenticellato subnitido ramulorum atro ramorum stramineo. *Folia* opposita, elliptica, elliptico-oblanceolata vel oblonga, apice obtuse acuminata, basi cuneata, 5–15 cm. longa, 2–5 cm. lata, rigide chartacea, margine integro leviter recurvo, nervis lateralibus utrinque numerosis parallelis cum nervo intramarginali supra subprominulis subtus conspicuis ; petioli 0·5–1 cm. longi, supra canaliculati. *Cymae* in paniculas terminales 5–6 cm. longas dispositae ; pedicelli 1–3 mm. longi, albo-tomentelli, basin versus 2-bracteolati. *Calycis* segmenta ovato-lanceolata, acutiuscula, circiter 1 mm. longa, extra albo-tomentella. *Corollae* tubus 6 mm. longus, paullo ultra 1 mm. diametro, lobi oblique elliptici, acutiusculi, 2 mm. longi, 1·5 mm. lati, basi squamulis minutis instructi. *Antherae* parvae, filamentis brevibus suffultae.

Chiengmai, Doi Sootep, in evergreen jungle, 1260 m., *Kerr*, 783.

Hunteria corymbosa, *Roxb.*—F.B.I., iii. p. 637. *Gynopogon lanceolatum*, Kurz, For. Fl. Burma, ii. p. 177 (ex F.B.I., l.c.).

Kedah, Langkawi, *Curtis*, 237.

Distr. India, Burma, Malaya.

Cerbera Odollam, *Gaertn.*—F.B.I., iii. p. 638 ; For. Fl. Burma, ii. p. 171.

Bangkok, *Zimmermann*, 129 ; Chiengmai, Doi Sootep, 1050 m., *Hosseus*.

Distr. S.E. Asia, Australia.

Ervatamia coronaria, *Stapf.* *Tabernaemontana coronaria*, Willd. —F.B.I., iii. p. 646. *T. divaricata*, Bl.—For. Fl. Burma, ii. p. 174.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 612 ; Bangkok, *Schomburgk*, 185, *Zimmermann*, 16.

Distr. India, Assam, China, Malaya, Trop. Africa.

Ervatamia peduncularis, *King et Gamble.* *Tabernaemontana peduncularis*, Wall.—F.B.I., iii. p. 647.

Kedah, Langkawi, (ex Mat. Mal. Pen., 19, p. 452).

Distr. Malay Peninsula.

Holarrhena antidysenterica, *Wall.*—F.B.I., iii. p. 644 ; For. Fl. Burma, ii. p. 182 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 85.

Chiengmai, Doi Sootep, 300–360 m., *Kerr*, 1129, 1399.

Distr. S. E. Asia—occasionally cultivated in Tropics.

Kerr's specimens belong to the form *pubescens* (*Wall.*, pro. sp.).

Holarrhena Curtisii, *King et Gamble*, Mat. Mal. Pen., 19, p. 446.

Trang, *Curtis*, 3392.

Distr. Cambodia.

Vallaris Heynei, *Spr.*—F.B.I., iii. p. 650. *V. dichotoma*, Wall.—For. Fl. Burma, ii. p. 181.

Chieng Dao, in scrub jungle, 450 m., *Kerr*, 1051 ; Chiengmai, 330 m., *Kerr*, 1703.

Distr. India, Burma, Assam.

Parsonia spiralis, *Wall.*—F.B.I., iii. p. 650 ; For. Fl. Burma, ii. p. 180.

Kedah, Langkawi, (ex Mat. Mal. Pen., 19, p. 457).

Distr. India, Burma, Assam, China, Malaya.

Pottsia cantonensis, *Hook. et Arn.*—F.B.I., iii. p. 652 ; For. Fl. Burma, ii. p. 190.

Kedah, (ex Mat. Mal. Pen., 19, p. 463).

Distr. Indo-China, China, Malaya.

Wrightia dubia, *Spr.* *Strophanthus Jackianus*, Wall.—F.B.I., iii. p. 655.

Trang, (ex Mat. Mal. Pen., 19, p. 466).

Var. **membranifolia**, *King et Gamble*, Mat. Mal. Pen., 19, p. 466.

Tongkah, *Curtis*, 2915.

Distr. Malay Peninsula (*type*).

Wrightia javanica, *DC.*

Tongkah, *Curtis*, 3054.

Distr. Java.

Wrightia laevis, *Hook. f.*—F.B.I., iii. p. 654.

Poongah, *Curtis*, 2943.

Distr. Malaya.

Wrightia religiosa, *Benth.*—F.B.I., iii. p. 653, *in nota*.

Bangkok, *Schomburgk*, 132, 171, *Murton*, 6, *Zimmermann*, 24, 115. Siam, *Binnendyck*, *Christie*.

According to Schomburgk this plant is often cultivated in gardens in and around Bangkok on account of its odoriferous flowers. It is also cultivated at Singapore (*Maingay ! Schomburgk !*).

Strophanthus Wallichii, *DC.*—F.B.I., iii. p. 655. *S. caudatus*, Kurz, For. Fl. Burma, ii. p. 193.

Tongkah, *Curtis*, 2931.

Distr. India, Burma, Assam.

Aganosma marginata, *Don*—F.B.I., iii. p. 663 ; For. Fl. Burma, ii. p. 186 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 86.

Chiengmai, in mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 585 ; Siam, *Murton*, 136.

Distr. S. E. Asia.

Ichnocarpus frutescens, *R. Br.*—F.B.I., iii. p. 669 ; For. Fl. Burma, ii. p. 185 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 86.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1459.

Distr. S.E. Asia, Australia.

I have not seen *Schomburgk*, 272 enumerated by Williams, Bull. Herb. Boiss., v. (1905) p. 949 as *Quirivelia bantamensis*, Williams, and in the MSS. lists in Herb. Kew as *Ichnocarpus frutescens*.

Anodendron paniculatum, *DC.*—F.B.I., iii. p. 668 ; For. Fl. Burma, ii. p. 188.

Tongkah, Puket, *Curtis*, 2933.

Distr. S.E. Asia, Australia.

✓ **Trachelospermum siamense**, *Craib*, sp. n., a *T. jasminoidi*, Lem., foliis majoribus, alabastris apice longius attenuatis, corollae tubo longiore, a *T. fragrante*, Hook. f., alabastris apice longius attenuatis, corollae lobis majoribus, antherarum apicibus exsertis, a *T. gracilipide*, Hook. f., calycis segmentis multo majoribus recedit.

Suffrutex scandens ; ramuli teretes, primo parcissime puberuli mox glabri, vel densissime puberuli pilis longius persistentibus, cortice rubro-brunneo obtecti. *Folia* oblongo-lanceolata vel oblongo-oblanceolata, apice obtusa, brevissime mucronata, basi cuneata, 4·5–13·5 cm. longa, 1·5-4·3 cm. lata, subcoriacea, utrinque glabra, supra nitida, viridia, subtus pallidiora, margine integra, nervis lateralibus utrinque circiter 10 intra marginem arcuatis costa supra impressa nervis lateralibus supra subconspicuis subtus cum nervis transversis prominulis ; petioli vix 1 cm. attingentes, supra canaliculati, plus minusve appresse pubescentes, subtus convexi, fere glabri. *Cymae* laxe paniculatae, pedunculo communi 3–6·5 cm. longo ; pedicelli 0·6–1 cm. longi, glabri, basi bractea parva lanceolata ciliolata instructi. *Sepala* ovato-lanceolata, obtusiuscula, basi gibbosa, 3·5 mm. longa, 2 mm. lata, ciliolata, intus basi squamilis instructa. *Corollae* albae tubus 1·4 cm. longus, 1·5 mm. diametro, apice post antheram quemque lineis duobus pilosis instructus, lobi 1 cm. longi, 8 mm. lati. *Antherae* paulo exsertae, sessiles, basi cornutae, apice in appendiculam membranaceam parum inflexam productae. *Discus* 5-lobatus [vel interdum e glandis secretis constitutus ?], ovario vix aequialtus.

Chiengmai, Doi Sootep, 600 m., *Kerr*, 1133.

Rhynchodia Wallichii, *Benth.*—F.B.I., iii. p. 667. *Cercocoma Wallichii*, Kurz, For. Fl. Burma, ii. p. 187.

Kedah, Langkawi, *Curtis*, 3203.

Distr. India, Indo-China, Malay Peninsula.

Amalocalyx microlobus, *Pierre ?*

Chiengmai, in mixed jungle at foot of Doi Sootep, 300 m., *Kerr*, 716, 716a.

Distr. Laos.

Kerr's specimens differ from typical *A. microlobus* in the peduncle being rather thicker, the flowers evidently slightly larger, calyx lobes and corolla tube broader, and the fruit longer and narrower. Unfortunately the material on which Pierre founded his species is rather poor and in the absence of better material I hesitate to separate the Chiengmai plant from it.

Beaumontia sp. n. ?

Kow Hoo Wen, *Murton*, 113.

Probably represents a new species but the material is insufficient for diagnosis.

Asclepiadaceae.

Zygostelma Benthami, *Baill.* *Hemidesmus indicus*, Williams, Bull. Herb. Boiss., v. (1905) p. 950, *non* R. Br.

Anhin, Schomburgh, 284.

Gymnanthera insularum, *King et Gamble*, Mat. Mal. Pen., 19, p. 514.

Kedah, Langkawi, (ex Mat. Mal. Pen., l.c.).

Finlaysonia obovata, *Wall.*—F.B.I., iv. p. 7 ; For. Fl. Burma, ii. p. 197.

Kasoom, (ex Mat. Mal. Pen., 19, p. 513).

Distr. India, Burma, Malay Peninsula.

Atherandra acutifolia, *Dcne.*—F.B.I., iv., p. 9.

Kedah, Langkawi, (ex Mat. Mal. Pen., 19, p. 516).

Distr. Malaya.

Streptocaulon Griffithii, *Hook. f.*, F.B.I., iv. p. 10. *S. tomentosum*, Williams, Bull. Herb. Boiss., v. (1905) p. 949, *non.* Wight.

Chiengmai, in mixed and evergreen jungles on Doi Sootep, 330 m., *Kerr*, 1244 ; Anhin, *Schomburgk*, 252.

Distr. Tenasserim, Mergui, Tonkin, S. China.

Streptocaulon Wallichii, *Wight*—F.B.I., iv. p. 9.

Kedah, *Bell* in Hb. Cantley, 229.

Distr. Malay Peninsula.

Myriopteron extensum, *K. Sch.* *M. paniculatum*, Griff.—F.B.I., iv. p. 11. *Streptocaulon extensum*, Wight—For. Fl. Burma, ii. p. 198.

Chiengmai, in mixed jungle, foot of Doi Sootep, 300 m., *Kerr*, 770.

Distr. Bengal, Assam, Burma, Yunnan.

Gongylosperma Curtisii, *King et Gamble*, Mat. Mal. Pen., 19, p. 510.

Poongah, (ex Mat. Mal. Pen., l.c.).

Secamone micrantha, *Dcne.*

Kedah, Langkawi, *Curtis*, 2800.

Distr. Malaya.

Toxocarpus Curtisii, *King et Gamble*, Mat. Mal. Pen., 19, p. 521.

Kedah, Langkawi, (ex Mat. Mal. Pen., l.c.).

Distr. Perak (ex Mat. Mal. Pen., l.c.).

Toxocarpus Hosseusii, *Schlechter*, Engl. Bot. Jahrb., xl. Beibl. 92, p. 1.

Paknampo, *Hosseus*, 13 ; ? Chiengmai, in scrub jungle, 300 m., *Kerr*, 1668.

The specimens collected by Kerr are in fruit only and are referred doubtfully to this species.

Toxocarpus langkawiensis, *King et Gamble*, Mat. Mal. Pen., 19, p. 523.

Kedah, Langkawi, (ex Mat. Mal. Pen., l.c.).

Oxystelma esculentum, *Br.*—F.B.I., iv. p. 17.

Chiengmai, 300 m., *Kerr*, 1443.

Distr. S.E. Asia.

Lao name, Kio Kou Mai.

Calotropis gigantea, *Br.*—F.B.I., iv. p. 17 ; For. Fl. Burma, ii. p. 200.

Bangkok, *Zimmermann*, 152.

Distr. India, Burma, China, Malaya.

Asclepias curassavica, *Linn.*—F.B.I., iv. p. 18 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 87.

Chiengmai, Doi Sootep, 1020 m., *Kerr*, 874.

Native of Trop. America.

Raphistemma pulchellum, *Wall.*—F.B.I., iv. p. 19.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1469.

Distr. Sikkim, Yunnan, Burma, Assam.

Gymnema acuminatum, *Wall.*—F.B.I., iv. p. 30 ; For. Fl. Burma, ii. p. 202 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 87.

Kedah, Langkawi, *Curtis*, 2811.

Distr. Indo-China, Malaya.

Gymnema Griffithii, *Craib*, sp. n., a *G. molli*, Wall., caulibus pilis longiusculis patulis instructis, corona diversa recedit.

Caules repentes vel volubiles, albo-tomentelli praetereaque pilis longiusculis patentibus densius instructi. *Folia* ovato-elliptica, ovato-lanceolata vel rarissime elliptica, apice acuminata, basi rotundata vel obtusa, 3–5 cm. longa, 1·2–3·6 cm. lata, rigide chartacea, supra parce appresse albo-pilulosa, subtus molliter pubescentia, margine integra, ciliata, nervis lateralibus utrinque 4–5 intra marginem arcuatis supra conspicuis subtus cum nervis transversis prominulis ; petioli usque ad 2 cm. longi, indumento ut in caulibus. *Cymae* densae, subsessiles vel pedunculis usque ad 5 mm. longis suffultae. *Sepala* 5, subrotundata, 3 mm. diametro, ciliata, extra puberula. *Corollae* lilacineae tubus 3 mm. longus, lobi oblongi, apice rotundati, irregulariter leviter emarginati, 2 mm. longi ; corona e squamis 5 apice emarginatis 0·5 mm. altis carnosis lobis alternis et anulo denso pilorum junctis.

Chiengmai, in open deciduous jungle on Doi Sootep, 450 m., *Kerr*, 635.

Distr. Upper Burma, Tsegain Hills, *Griffith*, 3806 (Kew Distr.) ; Southern Shan States, Keng Tung, *Mac Gregor*, 556 (v.s. in herb. Calc.).

Tylophora asthmatica, *Wight et Arn.*—F.B.I., iv. p. 44; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 87.
Bangkok, *Schomburgk*, 173.
Distr. India, Burma, Assam, Malay Archipelago.

Tylophora fasciculata, *Ham.*—F.B.I., iv. p. 40.
Chiengmai, in deciduous jungle on Doi Sootep, 390 m., *Kerr*, 644.
Distr. S. Nepal, Khasia, Upper Burma, Concan.

Tylophora Kerrii, *Craib*, sp. n., a *T. macrostachide*, Hook. f., cymis pedunculatis haud congestis, a *T. longifolia*, Wight, foliis angustioribus, floribus majoribus recedit.

Caules volubiles, monocarpici, ad 1·6 m. longi, bifacialiter, infra nodos ipsos praecipue breviter puberuli, striati. *Folia* lineari-lanceolata, apice acuta, basi obtusa, 4·5–13 cm. longa, 0·3–1 cm. lata, chartacea, fere glabra, costa supra impressa subtus prominente, nervis lateralibus utrinque circiter 8 intra marginem arcuatis supra obscuris subtus prominulis nisi iis foliorum apices versus evanidis, nervis transversis obscuris. *Cymae* axillares, pedunculo communi ad 1·5 cm. longo suffultae, glabrae; pedicelli usque ad 1 cm. longi, bracteis minutis. *Sepala* lanceolata, acuta, vix 2 mm. longa, ciliata. *Corollae* lobi oblongi, obtusi, circiter 6 mm. longi, 2·5 mm. lati, glabri. *Corona* e tuberculis 5 apice columnae staminali brevi adnatis basi gibbosis inter se liberis constituta.
Chiengmai, in open jungle on Doi Sootep, 1350 m., *Kerr*, 704.

Tylophora purpurea, *Wall.*—F.B.I., iv. p. 41.
Chiengmai, in scrub jungle on Doi Sootep, 330 m., *Kerr*, 1446.
Distr. Burma, bank of Irrawaddy.

Tylophora sootepensis, *Craib*, sp. n., ab affini *T. Augustiniana*, Craib, inflorescentia plerumque vix tam furcata, floribus majoribus, sepalis valde acutis recedit.

Herba volubilis, ramis striatis apices versus internodiorum bifacialiter parce piloso-pubescentibus. *Folia* ovato-lanceolata vel lanceolata, apice vix acuminata, basi cordata nisi juniora interdum rotundata vel obtuse cuneata, usque ad 17·5 cm. longa et 8 cm. lata, membranacea, costa supra parce pilulosa excepta glabra, nervis lateralibus utrinque circiter 7 intra marginem arcuatis supra conspicuis subtus prominulis; petioli usque ad 2·5 cm. longi, supra valde canaliculati, apice supra glandulis instructi. *Inflorescentia* e cymis plerumque sessilibus sed interdum pedunculatis unilateraliter dispositis, usque ad 30 cm. longa; pedicelli graciles, usque ad 1·2 cm. longi. *Sepala* ovato-lanceolata, acuta, 1·25 mm. longa, 0·75 mm. lata, glabra. *Corollae* albae tubus brevis, lobi ovato-elliptici, obtusi, oblique leviter emarginati, 4·5 mm. longi, 3 mm. lati, glabri. *Coronae* lobi columnae staminali adnati, basi gibbosi.
Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1310.
Owing to the flowers having been pressed quite flat it has been found impossible to give minute details of their structure, *e.g.*, in the case of the shape of the corona lobes.

There is no doubt but what this plant is closely allied to *Neohenrya Augustiniana*, Hemsl., but in the writer's opinion this plant is a *Tylophora* and should be named *Tylophora Augustiniana*, Craib.

Marsdenia tinctoria, *Br.*—F.B.I., iv. p. 34; For. Fl. Burma, ii. p. 201.
Kedah, (ex Mat. Mal. Pen., 19, p. 546).
Distr. India, Burma, China, Malaya.

Marsdenia volubilis, *T. Cooke.* *Dregea volubilis*, Benth. ex Hook. f., F.B.I., iv. p. 46.
Siamese States, Pulau Badak, (ex Mat. Mal. Pen., 19, p. 548).
Distr. India, Java.

Telosma minor, *Craib*, comb. nov. *Pergularia minor*, Andr.—F.B.I., iv. p. 38. *P. odoratissima*, Kurz, For. Fl. Burma, ii. p. 203, *non* Sm.
Bangkok, *Zimmermann*, 151.
Distr. India, Indo-China, China.

Telosma pallida, *Craib*, comb. nov. *Pergularia pallida*, Wight et Arn.—F.B.I., iv. p. 38; For. Fl. Burma, ii. p. 203; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 88.
Chiengmai, in scrub jungle, 300 m., *Kerr*, 1224.
Distr. India, Indo-China.

Heterostemma siamicum, *Craib*, sp. n., ab *H. alato*, Wight, caulibus haud bifacialiter pubescentibus, foliis maturis basi alte cordatis, nervis subtus haud alatis, coronae lobis pro corollae magnitudine majoribus distinguenda.

Caules primo pilis ferrugineis patulis instructi, mox fere glabri. *Folia* oblonga, ovato-oblonga vel ovato-rotundata, basi juniora cuneata, matura alte cordata, apice cuspidata, acuta, 4–10 cm. longa, 1·7–7·5 cm. lata, chartacea, utrinque pilulosa, margine integra, e basi 5-nervia, nervis secondariis (e costa ortis) utrinque 2–3 intra marginem arcuatis omnibus supra conspicuis subtus prominulis nervis transversis supra subconspicuis subtus vix prominulis; petioli 2–8 cm. longi, supra valde canaliculati, apice glandulis paucis fasciculatis instructi. *Umbellae* axillares, pluriflorae, pedunculis 1·5–2 cm. longis suffultae; pedicelli 1·5–2 cm. longi. *Sepala* late lanceolata, obtusa, circiter 1 mm. longa, extra parce appresse pilulosa, ciliata. *Corollae* luteae lobi ovato-lanceolati vel oblongo-lanceolati, apice breviter bifidi, 3·5 mm. longi, 2·5 mm. lati, extra pilulosi, intra pulverulento-tomentelli. *Coronae* lobi petaloidei, corollae appressi, lanceolati, acuti, basi incrassati et appendiculati, 2 mm. longi.
Chiengmai, scandent on village hedgerow, 300 m., *Kerr*, 1324.

Hoya parasitica, *Wall.*—F.B.I., iv. p. 57.
Chiengmai, Doi Sootep, 330–660 m., *Kerr*, 1690.
Distr. India, Burma, Assam, Malay Peninsula.

Hoya Ridleyi, *King et Gamble*, Mat. Mal. Pen., 19, p. 575.
Kedah, Pulau Songsong (ex Mat. Mal. Pen., l.c.).
Distr. Malay Peninsula (ex Mat. Mal. Pen., l.c.).

Hoya Engleriana, *Hosseus*, Notizbl. Bot. Gart. Berl., No. 40, p. 315.
Described from a specimen in cultivation at Dahlem collected on Doi Sootep, 1580 m. by *Hosseus*.

Hoya Kerrii, *Craib*, sp. n., ab *H. obovata*, Dcne., cui affinis, foliis apice bilobis floribus fere duplo minoribus recedit.

Caulis scandens, glaber. *Folia* opposita, obovata vel orbiculata, apice biloba lobis rotundatis, basi late cuneata vel subrotundata,

4–12 cm. longa, 5–9·5 cm. lata, crasso-carnosa, utrinque glabra, marginibus revoluta; petioli 5–15 mm. longi, 5 mm. crassi. *Umbellae* 4–5 cm. diametro; pedunculus communis 2–3 cm. longus, 3 mm. crassus, glaber; pedicelli graciles, 1·3–1·8 cm. longi, puberuli. *Sepala* ovato-oblonga, obtusissima, 2·5 mm. longa, puberula et ciliata. *Corolla* cum lobis revolutis 9 mm. diametro, extra glabra, intra papillato-puberula, albida, disco rubro-tincta; lobi deltoideo-ovati, acuti, 4–5 mm. longi, 4 mm. lati, revoluto-reflexi. *Coronae* lobi crasso-carnosi, 2·5 mm. longi, acuti, dorso canaliculati, supra concavo-excavati cum tuberculo parvo in cavitate, rubescentes.

Chiengmai, in eng jungle on Doi Sootep, 390 m., *Kerr*, 1810.

A living plant sent by Dr. Kerr to the Royal Botanic Gardens, Glasnevin, Dublin, which flowered there in August of the present year, differs from the wild specimens only in having a minute and scanty pubescence on the stem, peduncle and both sides of the leaf which may be due to change of climatic conditions.

Hoya siamica, *Craib*, sp. n., ab *H. longifolia*, Wall., foliis latioribus haud in petiolos attenuatis, corona majore suberecta recedit.

Folia lanceolata, oblongo-lanceolata vel ovato-lanceolata, apice acutiuscula, basi obtusa, 3·7–9·5 cm. longa, 1·5–2·2 cm. lata, utrinque glabra, margine leviter recurvo, sicco coriacea, nervis omnino obscuris; petioli 0·5–1·5 cm. longi, glabri. *Umbellae* 10–14-florae, pedunculo 1–5 cm. longo glabro suffultae; pedicelli 2 cm. longi, glabri. *Sepala* parva, ovato-lanceolata, acuta, primo densius puberula. *Corolla* usque ad 1·5 cm. diametro, extra glabra, intra loborum apicibus acutis exceptis et praesertim marginem versus puberula. *Coronae* lobi suberecti, supra concavi sed medio umbone instructi, 3–3·5 mm. longi.

Chiengmai, in evergreen jungle on Doi Sootep, 1500–1650 m., *Kerr*, 724.

Dischidia nummularia, *Br.*—F.B.I., iv. p. 49.

Chiengmai, in deciduous jungle on Doi Sootep, 300–750 m., *Kerr*, 553.

Distr. Burma, Chittagong, Malaya, Australia.

Dischidia Rafflesiana, *Wall.*—F.B.I., iv. p. 50.

Chiengmai, in deciduous jungle on Doi Sootep, 300–600 m., *Kerr*, 624.

Distr. Burma, Assam, Malaya, Australia.

Dischidia singularis, *Craib*, sp. n., a speciebus asiaticis foliorum forma facile distinguenda.

Planta epiphytica, corolla excepta glabra; caules graciles, sicco viridescentes vel brunnescentes, irregulariter striati. *Folia* linearia sed paulo supra medium expansa, vel lanceolata, apice plerumque acuta, basi in petiolum plus minusve distinctum attenuata, 2·5–6·5 cm. longa, 0·3–2 cm. lata, margine revoluto, nervis obscuris. *Umbellae* pluriflorae, plurumque ad apices ramulorum brevium crassorum gestae; pedicelli usque ad 1 mm. longi. *Sepala* parva, ovato-lanceolata, obtusa. *Corolla* urceolata, lobis exceptis glabra; tubus 2 mm. longus, lobi lanceolati, acuti, 1·5 mm. longi, suberecti, crassi, extra glabri, intra lobo utroque pilorum alborum linea densa tubi os

claudente et e basi paulo supra medium extensa instructo. *Coronae* lobi erecti, membranacei, subrotundati, distincte stipitati.

Chiengmai, on trees in open jungle on Doi Sootep, 900–1200 m., *Kerr*, 1294, 1294*a*.

Brachystelma Kerrii, *Craib*, sp. n., ab affini *B. eduli*, Coll. et Hemsl., caule elongato, internodiis elongatis facile distinguenda.

Herba perennis ; rhizoma tuberosum, sicco 2 cm. diametro ; caulis monocarpicus, simplex, erectus, gracilis, fere 5 dm. altus. *Folia* sparsa, angusta, acuta, 6–6·5 cm. longa, sessilia, glabra, costa sicco supra leviter impressa subtus prominula, nervis lateralibus omnino obscuris. *Inflorescentia* terminalis, pauciflora ; pedicelli 7 mm. longi, puberuli. *Calycis* lobi lanceolati, acuti, 1·5 mm. longi, glabri. *Corolla* atro-purpurea (ex *Kerr*) ; lobi late lanceolati, acutiusculi, marginibus recurvis, 5 mm. longi, 1·5 mm. lati, supra parce pilosi.

Chiengmai, in deciduous jungle on Doi Sootep, 360 m., *Kerr*, 1273.

Up to the present there has been received at Kew only one specimen with one expanded flower, which unfortunately had been pressed too flat to allow a complete description being given.

Ceropegia sootepensis, *Craib*, sp. n., ab affini *C. angustifolia*, Wight, foliis longioribus angustioribus vix petiolatis, umbellis subsessilibus recedit.

Herba scandens ; caules graciles, straminei, parcissime puberuli. *Folia* subsessilia, linearia vel anguste lineari-lanceolata, apice acuta, basi attenuata, 5–18 cm. longa, 1–9 mm. lata, chartacea, supra puberula vel fere scaberula, subtus fere glabra, margine integro revoluto. *Umbellae* axillares, pauciflorae, subsessiles ; bracteae parvae ; pedicelli usque ad 9 mm. longi, fere glabri. *Sepala* lanceolata, acuta, circiter 5 mm. longa. *Corolla* ad 5 cm. longa, basi ellipsoidea vel anguste ellipsoidea, medio constricta, lobis 2 cm. longis. *Coronae* exterioris lobi angusti, usque ad 1·5 mm. longi, interioris lobi eos exterioris duplo superantes.

Chiengmai, in open deciduous jungle on Doi Sootep, 450 m., *Kerr*, 695.

Loganiaceae.

Mitreola oldenlandioides, *Wall.*—F.B.I., iv. p. 79.

Chiengmai, in mixed jungle on Doi Sootep, 330 m., *Kerr*, 1462.

Distr. India, Burma, Malaya, Australia.

Buddleia asiatica, *Lour.*—F.B.I., iv. p. 82 ; For. Fl. Burma, ii. p. 250 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 90.

Chiengmai, Doi Sootep, 300–800 m., *Kerr*, 546, *Hosseus*, 277, 453 ; Ban Salu, 300 m., *Hosseus*, 382.

Distr. India, S. China, Indo-China, Malaya.

Buddleia macrostachya, *Benth.* ?—F.B.I., iv. p. 81.

Doi Chieng Dao, 2180 m., *Hosseus*, 400.

Distr. Himalayas, Manipur, Khasia.

Fagraea Curtisii, *King et Gamble*, Mat. Mal. Pen., 19 p 605.

Kedah, Langkawi, *Curtis*, 1676.

Fagraea obovata, *Wall.*—F.B.I., iv. p. 83 ; For. Fl. Burma, ii. p. 205.

Kedah, (ex Mat. Mal. Pen., 19 p. 606).

Distr. India, Khasia, Malaya.

Strychnos nux-vomica, *Linn.*—F.B.I., iv. p. 90 ; For. Fl. Burma, ii. p. 166 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 90.

Chiengmai, in deciduous jungle on lower slopes of Doi Sootep, 300–600 m., *Kerr*, 603 ; Phre, 180 m., *Luang Vanpruk*, 197.

Distr. India, Burma.

Lao name, Tung Ton (ex *Luang Vanpruk*).

Strychnos Vanprukii, *Craib*, sp. n., a *S. paniculata*, Champ., foliis multo majoribus, inflorescentia axillari brevi densa recedit.

Ramuli obscure tetragoni, circiter 2·5 mm. diametro, glabri, virides. *Folia* ovato-oblonga vel oblongo-elliptica, apice acuminata, basi late cuneata vel subrotundata, 13–17 cm. longa, 6–7 cm. lata, subcoriacea, laete viridia, utrinque glabra, tripli-nervata nervis ad apicem euntibus supra conspicuis subtus prominentibus et praeterea nervis duobus dilutis intramarginalibus e basi fere ad apicem instructa, nervis e costa ortis numerosis subparallelis pagina utraque conspicuis ; petioli vix 1 cm. longi, supra canaliculati, glabri. *Cymae* axillares, densae, breves, sessiles vel breviter pedunculatae ; pedicelli fere 2 mm. longi, bracteolis duobus calycis segmentis similibus instructi. *Calycis* circiter 1 mm. alti segmenta ovato-rotundata, brevissime obtuse acuminata, ciliolata. *Corollae* tubus 1·5 mm. longus, lobi oblongo-lanceolati, acutiusculi, circiter 2·5 mm. longi, 1·5 mm. lati, per anthesin recurvi, extra glabri intra inferne pilosi. *Stamina* exserta, filamentis 1·25 mm. longis glabris, antheris 0·75 mm. longis glabris *Ovarium* 1 mm. altum, cum stylo vix 2 mm. longo glabrum.

Me Yuak Phre, 240 m., *Luang Vanpruk*, 234.

Gentianaceae.

Exacum pteranthum, *Wall.*—F.B.I., iv. p. 99.

Chiengmai, in mixed jungle on Doi Sootep, 390 m., *Kerr*, 1482.

Distr. Moulmein, Tavoy.

Exacum sutapense, *Hosseus*.

Chiengmai, Doi Sootep, 1650 m., *Kerr*, 1499, *Hosseus*, 194.

Exacum tetragonum, *Roxb.*—F.B.I., iv. p. 95.

Nakontai, 150 m., *Hosseus*, 724.

Distr. Himalayas, Khasia, China, Philippines.

Differs from typical *E. tetragonum* in its slightly broader leaves.

Microrphium pubescens, *C. B. Clarke*, Mat. Mal. Pen., 16 p. 88.

Kedah, (ex Mat. Mal. Pen., l.c.).

Canscora decussata, *Roem. et Sch.*—F.B.I., iv. p. 104.

Chiengmai, Doi Sootep, 420 m., *Kerr*, 1521.

Distr. India, Burma, Trop. Africa, Mascerene Islands.

Canscora diffusa, *Br.*—F.B.I., iv. p. 103 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 90.

Near Lakon, in deciduous jungle, 300 m., *Kerr*, 977 ; Banks of Meh Ping, 400 m., *Hosseus*, 387.

Dist. India, China, Indo-China, Malaya, Australia, Trop. Africa.

Canscora pentanthera, *C. B. Clarke*, Mat. Mal. Pen., 16 p. 89.

Kedah, Langkawi, (ex Mat. Mal. Pen., l.c.).

Distr. Malay Peninsula, (Selangor).

Swertia angustifolia, *Ham.*—F.B.I., iv. p. 125.
Chiengmai, Doi Sootep, in open grassy spots, 1500 m., *Kerr*, 885.
Distr. Himalayas.

Swertia pulchella, *Ham.*—F.B.I., iv. p. 125.
Chiengmai, in deciduous jungle on Doi Sootep, 540 m., *Kerr*, 1494.
Distr. Himalayas, Khasia, China.

Limnanthemum indicum, *Thw.*—F.B.I., iv. p. 132; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 91.
Chiengmai, 300 m., *Kerr*, 1634.
Distr. S.E. Asia, Australia, Mascerene Is.

Hydrophyllaceae.

Hydrolea zeylanica, *Vahl*—F.B.I., iv. p. 133.
Bank of Meh Ping, between Raheng and Paknampo, 105 m., *Kerr*, 502; Ban Meh Kah, 195 m., *Kerr*, 912; Wang Djao, *Hosseus*, 125.
Distr. Tropics.

Boraginaceae.

Ehretia siamensis, *T. et B.*, Cat. Hort. Bog., 139, *nomen.*
Siam, *Teysmann*, anno 1868.
The material in Herb. Kew is too incomplete for diagnosis.

Ehretia, sp. facie *E. hottentoticae*, Burch. similis.
Bangkok Palace Gardens, cultivated, *Murton*, 5.

Cordia Griffithii, *C. B. Clarke*, F.B.I., iv. p. 139.
Kedah, (ex Mat. Mal. Pen., 18 p. 280).
Distr. Malay Peninsula.

Cordia subcordata, *Lamk.*—F.B.I., iv. p. 140; For. Fl. Burma, ii. p. 209.
Kedah, (ex Mat. Mal. Pen., 18 p. 279).
Distr. India, Malaya, Australia—often cultivated.

Rhabdia lycioides, *Mart.*—F.B.I., iv. p. 145. *R. viminea*, Dalz.—For. Fl. Burma, ii. p. 211.
Banks of Meh Ping, Hue Sam Ngao, 140 m., *Hosseus*, 542.
Distr. Tropical Asia, Africa, America.

Tournefortia ovata, *Wall.*—F.B.I., iv. p. 147.
Between Lakon and Phre, near Ban Meh Tah, 300 m., *Kerr*, 997.
Distr. Burma, S. China.

Heliotropium indicum, *Linn.*—F.B.I., iv. p. 152.
Chiengmai, Doi Sootep, 300 m., *Hosseus.*
Distr. Tropical Asia, Africa, America.

Cynoglossum micranthum, *Desf.*—F.B.I., iv. p. 156.
Chiengmai, in deciduous jungle on Doi Sootep, 720 m., *Kerr*, 698.
Distr. S.E. Asia.

Convolvulaceae.

Argyreia Kerrii, *Craib*, sp. n., ab *A. Thomsoni*, Craib, pedunculis brevioribus, sepalis vix hirsutis recedit.

Caules scandentes vel repentes, juventute densius albo-pubescentes. *Folia* ovata vel late ovata, apice breviter acuminata, acutissima,

basi cordata, 4–19 cm. longa, 3·5–14 cm. lata, chartacea, supra pilis rigidis basi tuberculatis parce instructa, subtus subvillosa, nervis lateralibus utrinque circiter 12 intra marginem arcuatis sicco supra subprominulis subtus conspicuis ; petioli ad 5 cm. longi, indumento ut in caule. *Inflorescentia* axillaris, pluriflora, pedunculo communi vix 2 cm. longo suffulta ; pedicelli ad 7 mm. longi ; bracteae ovato-lanceolatae, acuminatae, ad 2 cm. longae, 0·7 cm. latae, extra pubescentes, intra parcissime pubescentes. *Sepala* subaequalia, oblongo-oblanceolata, obtusa, ad 1 cm. longa, 0·6 cm. lata, extra medio appresse pubescentia. *Corolla* atro-purpurea (ex *Kerr*), anguste tubuloso-campanulata, 5 cm. longa, 1·7 cm. diametro, extra glabra. *Filamenta* basi parum dilatata, breviter pilosa.

Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 761.

Argyreia obtusifolia, *Lour.* *A. obtecta*, C. B. Clarke, F.B.I., iv. p. 186 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 93.

Chiengmai, Doi Sootep, 600–1500 m., *Kerr*, 1384, 1384a.

Distr. Indo-China, Hong-Kong, Malay Peninsula.

Argyreia Roxburghii, *Choisy*, var. **siamica**, *Craib*, var. nov., habitu *A. Roxburghii*, var. *amplae*, C. B. Clarke, similis sed sepalis exterioribus latioribus apice rotundatis distincta.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1395.

Argyreia Wallichii, *Choisy*—F.B.I., iv. p. 187.

Chiengmai, in mixed jungle on Doi Sootep, 420 m., *Kerr*, 1481.

Distr. Sikkim, Assam, Yunnan.

Argyreia sp. near *A. confusa*, Prain. *A. venusta*, Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 501, *non* Choisy.

Wang Djao, 100–150 m., *Hosseus*, 116.

Ipomoea aquatica, *Forsk.*, var. **reptans**, *Williams*, Bull. Herb. Boiss., v. (1905) p. 438 ; Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 502.

Chiengmai, 300 m., *Kerr*, 893.

Distr. Tropics.

Ipomoea caespitosa, *O. Kze.* *I. linifolia*, Bl.—F.B.I., iv. p. 205. *Merremia caespitosa*, Hallier f.—Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 502.

Near Raheng, 120 m., *Kerr*, 905 ; Wang Djao, *Hosseus*, 137.

Distr. S.E. Asia to Australia.

Ipomoea Henryi, *Craib*, sp. n., ab *I. siamensi*, Craib, foliis lanceolatis recedit.

Caules scandentes, lignosi, parce appresse setulosi. *Folia* late lanceolata, apice acutissima, basi rotundata, 14–20 cm. longa, 6–7 cm. lata, chartacea, supra costa nervisque setulosis exceptis glabra, subtus parce setulosa, nervis lateralibus utrinque 8–9 obliquis supra conspicuis subtus prominulis ; petioli 3–5 cm. longi, parce setulosi. *Inflorescentia* axillaris, pedunculo communi 13–14·5 cm. longo suffulta ; pedicelli 6–9 mm. longi, ut in pedunculo parce appresse hirsuti ; bracteae bracteolaeque deciduae. *Sepala* duo exteriora ovato-triangularia, 4 mm. longa, 4 mm. lata, apice obtusa, extra parce appresse hirsuta, interiora paulo majora parciusque hirsuta. *Corollae* tubuloso-infundibuliformis tubi pars basi aequalis

4 mm. longa, 3 mm. diametro, glabra, pars expansa 5 cm. longa, 1·7 cm. diametro, appresse hirsuta. *Filamenta* 1·3 cm. longa, basi parum dilatata et pilosa.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1489.

Distr. Yunnan, *Henry*, 13,387.

Ipomoea Nil, *Roth*. *I. hederacea*, Jacq.—F.B.I., iv. p. 199, p.p.

Chiengmai, 300 m., *Kerr*, 1486.

Distr. Tropics and subtropics.

Ipomoea obscura, *Ker*—F.B.I., iv. p. 207; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 96.

Chiengmai, 300 m., *Kerr*, 1346—"a garden weed."

Distr. Trop. Asia, Africa, Australia.

Ipomoea paniculata, *Br.* *I. digitata*, Linn.—F.B.I., iv. p. 202.

Bangkok, *Schomburgk*, 322; Chiengmai, in scrub jungle, 330 m., *Kerr*, 1336.

Distr. Tropics.

Ipomoea petaloidea, *Choisy*—F.B.I., iv. p. 212; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 96. *I. xanthantha*, Kurz, For. Fl. Burma, ii. p. 219.

Muang Prow, Meh Ngat, in deciduous jungle, 420 m., *Kerr*, 1036.

Distr. Oudh, Burma, Malaya.

Lao name, Kreua Kou Kom.

Ipomoea polyantha, *Miq.*, var. **affinis**, *C. B. Clarke*, F.B.I., iv. p. 206. *Merremia gemella*, Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 504. *M. umbellata*, Hosseus, l.c. p. 505.

Bangkok, *Zimmermann*, 83.

Distr. Bengal, Assam, Burma.

Ipomoea sagittaefolia, *Burm.* *I. sepiaria*, Koen. ex Roxb.—F.B.I., iv. p. 209.

Kedah, (ex Mat. Mal. Pen., 18 p. 317).

Distr. S.E. Asia.

Ipomoea siamensis, *Craib*, sp. n., floribus *I. popahensi*, Coll. et Hemsl., similis sed foliis ovatis vel ovato-rotundatis basi alte cordatis valde distincta.

Caules e radice perenni annui, procumbentes vel scandentes, pilis rigidiusculis patentibus vel plerumque reflexis instructi. *Folia* ovata vel ovato-rotundata, apice acuminata, acuta, basi alte cordata, 2·7–9·5 cm. longa, 2–8 cm. lata, tenuiter chartacea, ciliata, utrinque pauperrime setulosa, nervis lateralibus utrinque 4–7 pagina utraque conspicuis; petioli 2–6·5 cm. longi, indumento ut in caule. *Flores* axillares, solitarii, pedicellis circa 2 cm. longis suffulti. *Sepala* subaequalia, lanceolata, acuta, circiter 1 cm. longa, 2 mm. lata, extra hirsuta. *Corolla* anguste tubuloso-campanulata, purpurea et alba (ex *Kerr*), ad 6 cm. longa, 1·5 cm. diametro, extra longe parceque setosa.

Chiengmai, Doi Sootep, in mixed jungle 330–420 m., *Kerr*, 1401.

Ipomoea umbellata, *Linn.*, var. **orientalis**, *Hallier f.*—Williams, Bull. Herb. Boiss., v. (1905) p. 438, et Hosseus, l.c., p. 504, sub *Merremia*. *I. cymosa*, R. & S.—F.B.I., iv. p. 211.

Near Doi Saket, Meh Kung, 420 m., *Kerr*, 1022 ; near Chiengmai, 300 m., *Hosseus*, 373 ; Siam, *Murton*, 4.

Distr. Tropics.

Ipomoea vitifolia, *Sweet*—F.B.I., iv. p. 213 ; For. Fl. Burma, ii. p. 219 ; Williams, Bull. Herb. Boiss., v. (1905) p. 962 ; Hosseus, l.c., p. 503.

Between Lakon and Phre, near Pang Pooey, 420 m., *Kerr*, 983 ; Raheng, Wang Djao, *Lindhard*, 74.

Distr. S.E. Asia.

Ipomoea sp. near *I. carnea*, Jacq.

Bangkok, *Zimmermann*, 41—cultivated ?

Quamoclit pinnata, *Boj.* *Ipomoea Quamoclit*, Linn.—F.B.I., iv. p. 199 ; Hosseus, l.c., p. 502.

Chiengmai, 300 m., *Kerr*, 1347—"a garden weed" ; Bangkok, *Zimmermann*, 10.

Distr. Native of America—naturalised in S.E. Asia.

Lao name, Kaun Sa wun (ex *Kerr*).

Evolvulus alsinoides, *Linn.*—F.B.I., iv. p. 220.

Banks of Meh Ping near Raheng, *Kerr*, 503 ; Cape Liant, *Murton*, 39.

Distr. Tropics and subtropics.

Porana volubilis, *Burm.*—F.B.I., iv. p. 222 ; For. Fl. Burma, ii. p. 220 ; Hosseus, Bot. Centralbl., Beihefte, xxvii. 2, p. 501.

Bangkok, *Zimmermann*, 54.

Distr. India, Khasia, Manipur, Malaya.

Solanaceae.

Lycopersicum esculentum, *Mill.*—F.B.I., iv. p. 237.

Chiengmai, by a temple on Doi Sootep, 540 m., *Kerr*, 1252.

Native of Trop. America.

Lao name, Mă Keua Som.

Solanum album, *Lour.*

Raheng, *Lindhard*, 37.

Var. **Gaudichaudii**, *Dunal*—Williams, Bull. Herb. Boiss., v. (1905) p. 439.

Bangkok, *Zimmermann*, 17.

The writer has seen no authentic material of either the species or the variety. Lindhard's plant was so named by C. B. Clarke, and Zimmermann's was distributed under that name.

Solanum ferox, *Linn.*—F.B.I., iv. p. 233 ; For. Fl. Burma, ii. p. 226, excl. var.

Chiengmai, on waste ground, 300 m., *Kerr*, 1236.

Distr. India, S.E. China, Indo-China, Malaya.

Solanum Melongena, *Linn.*—F.B.I., iv. p. 235 ; Williams, Bull. Herb. Boiss., v. (1905) p. 439. *S. ferox*, Linn., var. *Trongum*, Kurz, For. Fl. Burma, ii. p. 226.

Chiengmai, on waste ground, 300 m., *Kerr*, 1237.

Distr. Tropics and subtropics.

Solanum nigrum, *Linn.*—F.B.I., iv. p. 229.
Chiengmai, on waste ground, 300 m., *Kerr*, 1231.
Distr. Widely spread in tropical and subtropical countries.

Solanum torvum, *Swartz*—F.B.I., iv. p. 234; For. Fl. Burma, ii. p. 225; Williams, Bull. Herb. Boiss., v. (1905) p. 439.
Chiengmai, Doi Sootep, 660–900 m., *Kerr*, 1801, *Hosseus*, 475.
Distr. S.E. Asia, Trop. America.
Evidently allied is *Zimmermann*, 25, which is destitute of flowers or fruit, and which was referred by Williams to *S. Melongena*.

Solanum verbascifolium, *Linn.*—F.B.I., iv. p. 230; For. Fl. Burma, ii. p. 225.
Chiengmai, in scrub jungle, 300 m., *Kerr*, 1225.
Distr. Tropics.

Datura Bojeri, *Del. ex Dunal.* *D. Metel*, Williams, Bull. Herb. Boiss., v. (1905) p. 439, *non* Linn.
Bangkok, *Zimmermann*, 109.
Distr. Japan, Sikkim, Trop. Africa—often cultivated?

Scrophulariaceae.

Mazus rugosus, *Lour.*—F.B.I., iv. p. 259; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 99.
Chiengmai, 300 m., *Kerr*, 1472—"a garden weed."
Distr. E. and S.E. Asia.

Lindenbergia macrostachya, *Benth.*—F.B.I., iv. p. 262; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 99; Williams, Bull. Herb. Boiss., v. (1905) p. 437. *L. siamensis*, Williams, l.c.
Bangkok, *Schomburgk*, 233. Siam, *Teysmann*.
Distr. Himalayas, China, Indo-China.

Lindenbergia philippensis, *Benth.*—F.B.I., iv. p. 261; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 99; Williams, Bull. Herb. Boiss., v. (1905) p. 437.
Between Lakon and Phre, near Ban Meh Tah, 300 m., *Kerr*, 986; Chiengmai, on old walls, 300 m., Kerr, 1692 (a dwarfed plant).
Distr. China, Indo-China, Malaya.

Lindenbergia urticaefolia, *Lehm.*—F.B.I., iv. p. 262; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 100.
Chiengmai, Doi Sootep, 300–720 m., *Kerr*, 923; banks of Meh Ping, 400 m., *Hosseus*, 388.
Distr. India, China, Indo-China.

Adenosma capitatum, *Benth.*—F.B.I., iv. p. 264; Williams, Bull. Herb. Boiss., v. (1905) p. 437.
Chiengmai, Doi Sootep, in deciduous jungle, 360 m., *Kerr*, 1431.
Distr. S.E. Asia.

Limnophila gracilipes, *Craib*, sp. n., *L. hirsutae*, Benth., valde affinis sed foliis angustioribus semper oppositis, racemis longioribus, pedunculis pedicellisque longioribus et gracilioribus differt.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1464.
Very closely allied to *L. hirsuta*, but readily distinguished by its narrower leaves and its laxer, more graceful inflorescence.

Limnophila gratioloides, *Br.*—F.B.I., iv. p. 271.
Pitsanulok, Ban Jang, 120 m., *Hosseus*, 701.
Distr. Trop. Asia, Australia, Africa.

Limnophila heterophylla, *Benth.*, var. **reflexa**, *Hook. f.*, F.B.I., iv. p. 270.
Kedah, (ex Mat. Mal. Pen., 18 p. 350).
Distr. Tenasserim.

Limnophila hirsuta, *Benth.*—F.B.I., iv. p. 268.
Doi Intanon, 1150 m., *Hosseus*, 332.
Distr. S. E. Asia, Australia.

Limnophila pulcherrima, *Hook. f.*, F.B.I., iv. p. 267 ?
Pitsanulok, Ban Djam, 120 m., *Hosseus*, 702.
Distr. Sikkim, Malaya.

This plant is closely allied to *L. diffusa*, Benth., and indeed may be only a form of that species. *Lindhard* 21, from Raheng named *L. diffusa*, by C. B. Clarke, is somewhat similar.

Limnophila Roxburghii, *G. Don*—F.B.I., iv. p. 265.
Kedah, Langkawi, at Coah, (ex Mat. Mal. Pen., 18 p. 347).
Distr. S. E. Asia.

Limnophila sessiliflora, *Blume*—F.B.I., iv. p. 270.
Kedah, Langkawi, (ex Mat. Mal. Pen., 18 p. 350).
Distr. S. E. Asia.

Torenia cordifolia, *Roxb.*—F.B.I., iv. p. 276.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1354.
Distr. India, Burma, China, Java.

Torenia flava, *Ham.*—F.B.I., iv. p. 278.
Chiengmai, Doi Sootep, 330 m., *Kerr*, 1353.
Distr. China, Indo-China, Malaya.

Torenia oblonga, *Hance.* *Vandellia oblonga*, Benth.
Pitsanulok, Ban Jang, *Hosseus*, 706 (Herb. Hoss. !).
Distr. Hong Kong, Laos, Cochinchina.

Torenia parviflora, *Ham.*—F.B.I., iv. p. 278.
Wang Djao, *Hosseus*, 110 (Herb. Hoss. !).
Distr. Tropics.

Lindernia angustifolia, *Wettst.* *Vandellia angustifolia*, Benth.—F.B.I., iv. p. 282.
Chiengmai, 300 m., *Kerr*, 1470.
Distr. S. E. Asia.

Lindernia crustacea, *F. Muell.*—Williams, Bull. Herb. Boiss., v. (1905) p. 437. *Vandellia crustacea*, Benth.—F.B.I., iv. p. 279.
Chiengmai, in mixed jungle on Doi Sootep, *Kerr*, 1333 ; Wang Djao, *Hosseus*, 126.
Distr. Tropics.

Lindernia hirsuta, *Wettst.*—*non* Williams, Bull. Herb. Boiss., v. (1905) p. 437. *Vandellia hirsuta*, Benth.—F.B.I., iv. p. 280.
Chiengmai, 300 m., *Kerr*, 1394—a garden weed.
Distr. S. E. Asia.

Schomburgk 203, quoted by Williams l.c. under this species consists of a mixture of *L. erecta* and *Bonnaya veronicaefolia*, var.

There is in Herb. Kew another plant collected by Schomburgk which is probably *Ilysanthes parviflora*, but the material is poor.

Lindernia pedunculata, *Wettst.* *Vandellia pedunculata*, Benth.—F.B.I., iv. p. 282.

Chiengmai, Doi Sootep, 330–1050 m., *Kerr*, 1358, *Hosseus*, 495, 808.

Distr. S. E. Asia.

Lindernia scabra, *Wettst.* *Vandellia scabra*, Benth.—F.B.I., iv. p. 281.

Chiengmai, Doi Sootep, 330 m., *Kerr*, 1250, 1359.

Distr. S. E. Asia, Trop. Africa, Madagascar.

Bonnaya brachiata, *Link. et Otto*—F.B.I., iv. p. 284 : Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 100.

Chiengmai, in mixed jungle on Doi Sootep, 360 m., *Kerr*, 1334 ; Raheng, *Lindhard*, 25.

Distr. India, Indo-China, China, Malaya.

Bonnaya veronicaefolia, *Spr.*, var. **grandiflora**, *Hook. f.*, F.B.I., iv. p. 285.

Chiengmai, 300 m., *Kerr*, 1471.

Doubtfully separable as a variety from *B. veronicaefolia* which is widely distributed in S. E. Asia.

Scoparia dulcis, *Linn.*—F.B.I., iv. p. 289 ; Williams, Bull. Herb. Boiss., v. (1905) p. 438.

Chiengmai, 300 m., *Kerr*, 1342 ; Menam, *Hosseus*, 3 ; Raheng, *Lindhard*, 18.

Distr. Tropics.

Buchnera cruciata, *Ham.*—F.B.I., iv. p. 298 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 100 ; Williams, Bull. Herb. Boiss., v. (1905) p. 962.

Raheng, *Lindhard*, 8 ; Chiengmai, Doi Sootep, 400–600 m., *Hosseus*, 314 ; Ban Tang, 120 m., *Hosseus*, 708.

Distr. India, China, Indo-China, Malaya.

Striga lutea, *Lour.*—F.B.I., iv. p. 299 ; Williams, Bull. Herb. Boiss., v. (1905) p. 438.

Chiengmai, among grass in deciduous jungle on Doi Sootep, 300–720 m., *Kerr*, 740 ; Siam, *Murton*, 47.

Distr. S.E. Asia, Madagascar, Trop. Africa, Arabia.

Striga Masuria, *Benth.*—F.B.I., iv. p. 300 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 101.

Chiengmai, Doi Sootep, among grass in eng jungle, 300–600 m., *Kerr*, 741.

Distr. India, Burma, China, Philippines.

Centranthera hispida, *Br.*—F.B.I., iv. p. 301.

Chiengmai, in eng jungle on Doi Sootep, 540 m., *Kerr*, 826 ; Wang Djao, *Hosseus*, 106.

Distr. S.E. Asia, Australia.

Sopubia trifida, *Ham.*—F.B.I., iv. p. 302 ; Coll. et Hemsl. Journ. Linn. Soc., xxviii. p. 101.

Chiengmai, in open grassy jungle on Doi Sootep, 1350–1500 m. *Kerr*, 1512.

Distr. India, Burma, Assam, China, Philippines, Africa, Madagascar.

Orobanchaceae.

Aeginetia indica, *Roxb.*—F.B.I., iv. p. 320.
Chiengmai, in deciduous and evergreen jungle on Doi Sootep, 300–990 m., *Kerr*, 765, 1515; Angkor, *Lebeuf*.
Distr. S.E. Asia.

Lentibulariaceae.

Utricularia bifida, *Linn.*—F.B.I., iv. p. 332; Williams, Bull. Herb. Boiss., v. (1905) p. 432.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 569.
Distr. S.E. Asia.

Utricularia bosminifera, *Ostenf.*, Fedde Rep. Nov. Sp., ii. (1906) p. 68.
Koh Chang, *Schmidt*, 704*a*.

Utricularia exoleta, *Br.*—F.B.I., iv. p. 329.
Chiengmai, Doi Sootep, 300 m., *Kerr*, 574.
Distr. S.E. Asia, Australia.

Utricularia flexuosa, *Vahl*—F.B.I., iv. p. 329; Williams, Bull. Herb. Boiss., v. (1905) p. 432.
Raheng, 126 m., *Kerr*, 505.
Distr. S.E. Asia, Australia.

Utricularia furcellata, *Oliver*, Journ. Linn. Soc., iii. p. 189. *U. furcellata*, var. *minor*, C. B. Clarke, F.B.I., iv. p. 334.
Chiengmai, among damp moss on rocks on Doi Sootep, 1350 m., *Kerr*, 787.
Distr. Sikkim, Khasia.

Utricularia hirta, *Klein*—F.B.I., iv. p. 332.
Chiengmai, Doi Sootep, 480–720 m., *Kerr*, 922.
Distr. Khasia, Chota Nagpur.

Utricularia Kerrii, *Craib*, sp. n., ab *U. rosea*, Edgew., calcare quam labio infero longiore distinguenda.

Herba erecta, 14–29 cm. alta. *Folia* per anthesin deficientia. *Scapus* strictus, plerumque simplex, flores 4 saltem gerens, squamis parvis medio affixis parce instructus; pedicelli circiter 1 mm. longi; bracteae medio affixae, utrinque acutae. *Calycis* segmentum inferum obovato-rotundatum, apice rotundatum, 2·5 mm. longum, superum quam infero paulo brevius, acutiusculum, amba extra minute puberula. *Corollae* fusco-purpureae labium superum obovato-ellipticum, emarginatum, 4 mm. longum, inferum refractum, apice truncato-emarginatum, 5 mm. longum; calcar 6 mm. longum, robustum, apice obtusiusculum; corollae partes omnes extra minute puberulae.

Chiengmai, in open marshy ground on Doi Sootep, 720 m., *Kerr*, 918.

Utricularia racemosa, *Wall.*—F.B.I., iv. p. 333.
Chiengmai, at foot of Doi Sootep, 300 m., *Kerr*, 570.
Distr. India, Assam, Burma, China.

Utricularia siamensis, *Ostenf.*, Fedde Rep. Nov. Sp., ii. (1906) p. 68.
Koh Chang, *Schmidt*, 704.

Utricularia sootepensis, *Craib*, sp. n., ab *W. filicauli*, Wall., calcare robusto recedit.

Herba terrestris, erecta, 4·5–8 cm. alta. *Folia* per anthesin rarissime deficientia, spathulata vel lineari-spathulata, 2–3 mm. longa, petiolo usque ad 3 mm. longo suffulta. *Utriculae* minutae, sparsae, globosae vel ellipsoideae. *Flores* terminales, solitarii vel 2–3 racemose dispositi ; bracteae parvae, medio fixae, utrinque acutae. *Sepala* subaequalia, vix 2 mm. longa. *Corollae* purpureae labium superum 1·5 mm. longum, inferum apice emarginatum, 1·75 mm. longum ; calcar late conicum, superne subito contractum, apice obtusum, 3 mm. longum.

Chiengmai, in eng jungle on Doi Sootep, 540 m., *Kerr*, 793.

Utricularia striatula, *Sm.* *U. orbiculata*, Wall.—F.B.I., iv. p. 334 ; Williams, Bull. Herb. Boiss., v. (1905) p. 433.

Chiengmai, on rocks and fallen tree trunks on Doi Sootep, 690–750 m., *Kerr*, 1418.

Distr. S.E. Asia.

Utricularia, *sp. n.*

Pitsanulok, 120 m., *Hosseus*, 711.

Gesneraceae.

Aeschynanthus macrocalyx, *Hosseus*, Notizbl. Bot. Gart. Berl., iv. (1907) p. 314, cum tab.

Described from a specimen which flowered in Berlin Botanic Garden, and which was introduced from Doi Sootep by *Hosseus*.

Aeschynanthus persimilis, *Craib*, sp. n., habitu *A. humili*, Hemsl., persimilis sed sepalis plerumque altius connatis, corolla intus haud papillata distinguenda.

Chiengmai, Doi Sootep, 1350–1650 m., *Kerr*, 515, *Hosseus*, 197.

In habit the Siam plant is very similar to the Yunnan *A. humilis*, differing from it chiefly in the want of the papillae on the inside of the corolla. Further collections of the Yunnan plant may prove that the Siam plant should be regarded rather as a variety or form.

Lysionotis serrata, *Don*—F.B.I., iv. p. 344.

Chiengmai, on rocks in open jungle and on trees in evergreen jungle, 1350–1500 m., *Kerr*, 791, 1376.

Distr. Himalayas, Assam, Burma, China.

Monophyllaea glabra, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 82.

Kasoom, (ex *Ridley*, l.c.).

Rhynchoglossum obliquum, *Blume*—F.B.I., iv. p. 367.

Chiengmai, on rocks by stream on Doi Sootep, 690 m., *Kerr*, 1424 ; Wang Djao, *Hosseus*, 97.

Distr. S.E. Asia.

Lepadanthus flexuosa, *Ridley*, Mat. Mal. Pen., 21 p. 782.

Kedah, Gunong Grenong, (ex *Ridley*, l.c.).

Tetraphyllum roseum, *Stapf ex Ridley*, Journ. Linn. Soc., xxxii. p. 524.
Pungah, (ex *Ridley*, l.c.).

Didymocarpus aureo-glandulosa, *C. B. Clarke*, Fedde Rep. Nov. Sp., iv. p. 292.
Chiengmai, Doi Sootep (ex *Clarke*, l.c.).

Didymocarpus fasciata, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 50.
Kedah, (ex *Ridley*, l.c.).
Distr. Pahang, Lingga, (ex *Ridley*, l.c.).

Didymocarpus (Eudidymocarpus) Kerrii, *Craib*, sp. n., *D. aureo-glandulosae*, C. B. Clarke, affinis sed foliis formae diversae supra haud argenteo-sericeis distincta.

Herba perennis, subacaulis vel caulescens, 4–21 cm. alta. *Folia* orbicularia, late elliptica, oblonga vel suprema ovata, apice rotundata vel obtusa, basi cordata, subcordata vel obtusa, 1–4·5 cm. longa, 1–4 cm. lata, chartacea vel rigide chartacea, margine crenata vel crenato-serrata, supra densius breviter pilosa, subtus aureo-glandulosa et praeterea costa nervisque pilosa, cetera fere glabra, nervis lateralibus utrinque circiter 6 supra subobscuris subtus prominulis ; petioli 0·4—5 cm. longi, ut in caule pilosi et parce aureo-glandulosi. *Inflorescentia* terminalis, pluriflora, superne parce glanduloso-pilosa, cetera glabra. *Calyx* tubuloso-campanulatus, 0·5 cm. longus, 0·3 cm. diametro, glaber, lobis parvis. *Corolla* paulo supra medium geniculata, 2 cm. longa, parte tubulosa 2·5 mm. diametro, apice 1 cm. diametro, glabra. *Filamenta* 2 mm. longa. *Ovarium* 1 cm. altum, cum stylo 3 mm. longo glabrum.

Chiengmai, on rocks in open jungle on Doi Sootep, 1350 m., *Kerr*, 786.

Didymocarpus lacunosa, *Hook. f.*, Bot. Mag. t. 7236.
Kedah, Langkawi, *Curtis*, 1655.

Didymocarpus (Eudidymocarpus) purpureo-picta, *Craib*, sp. n., affinis *D. stenanthei*, C. B. Clarke, sed calyce multo majore facile distinguenda.

Herba 14–21 cm. alta ; caulis simplex, pilosus et parcissime aureo-glandulosus. *Folia* oblonga, ovato-elliptica vel subrotunda, basi inaequalia, obtuse cuneata vel cordata, 3·5–10 cm. longa, 2·5–7·5 cm. lata, tenuiter chartacea, crenata vel crenato-serrata, supra pilosa, subtus costa nervisque praecipue pilosa praetereaque parce aureo-glandulosa, nervis lateralibus utrinque circiter 6 pagina utraque conspicuis ; petioli 1–11 cm. longi, pilosi. *Bracteae* 4 mm. longae, 6 mm. latae. *Calyx* campanulatus, 4 mm. longus, 5 mm. diametro, glaber, lobis parvis apice rotundatis. *Corolla* 2 cm. longa, glabra, parte cylindracea 2 mm. diametro parte suprema expansa 1 cm. diametro. *Filamenta* 2·5 mm. longa, glabra. *Ovarium* glabrum, 8 mm. altum, stylo glabro 3 mm. longo.

Chiengmai, Doi Sootep, on rocks by a stream, 750 m., *Kerr*, 1414.

Paraboea cordata, *Ridley*, var. **debilis**, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 65. *Didymocarpus cordata*, Ridley, var. *debilis*, Ridley—Williams, Bull. Herb. Boiss., v. (1905) p. 433.
Kedah, (ex *Ridley*, l.c.).

Paraboea ferruginea, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 68.
Kedah, Langkawi, (ex *Ridley*, l.c.).
This is presumably *Boea ferruginea*, Ridley—Williams, Bull. Herb. Boiss., v. (1905) p. 434 as *Curtis*, 2566 is quoted in Mat. Mal. Pen. for both *Boea ferruginea* and *Paraboea ferruginea*.

Paraboea laxa, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 70. *Didymocarpus laxa*, Ridley—Williams, Bull. Herb. Boiss., v. (1905) p. 433.
Kedah, Langkawi, (ex *Ridley*, l.c.).

Paraboea obovata, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 71.
Kedah, Langkawi, (ex *Ridley*, l.c.).

Paraboea regularis, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 68. *Didymocarpus regularis*, Ridley—Williams, Bull. Herb. Boiss., v. (1905) p. 434.
Kedah, Langkawi, (ex *Ridley*, l.c.).

Chirita anachoreta, *Hance*.
Chiengmai, Doi Sootep, on rocks by streams, 690 m., *Kerr*, 1417.
Distr. Canton, Yunnan.

Chirita brevipes, *C. B. Clarke*—F.B.I., iv. p. 359.
Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1164.
Distr. Khasia, Yunnan.

Chirita hamosa, *R. Br.*—F.B.I., iv. p. 360.
Chiengmai, Doi Sootep, 450–720 m., *Kerr*, 897, 1422.
Distr. India, Indo-China, Yunnan.

Chirita rupestris, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 59 ; Bot. Mag., t. 8333.
Kedah, Langkawi, (ex *Ridley*, l.c.).

Streptocarpus orientalis, *Craib*, sp. n., ab affini *S. Helsenbergii*, R. Br., caule vix glabrescente, foliis majoribus vix acutis, capsula graciliori recedit.

Herba erecta, 1·5–4 dm. alta ; caules solitarii, foliosi, usque ad inflorescentiam simplices, plus minusve, sed inferne nodosque prope densius, glanduloso-pilosi. *Folia* plerumque ovata vel elliptico-ovata, apice obtusa vel rotundata, basi interdum inaequalia, cuneata, 2·5–9 cm. longa, 2–7 cm. lata, membranacea, margine crenata vel crenato-serrata, utrinque pilosa, nervis lateralibus utrinque 4–5 subtus prominulis ; petioli 0·5–5 cm. longi, indumento ut in caule. *Pedicelli* ad 3 cm. longi, breviter parce glanduloso-pilosi. *Calycis* segmenta lanceolata vel lineari-lanceolata, circiter 4 mm. longa, 0·75 mm. lata, indumento dorso ut in pedicellis. *Corolla* purpurea (ex *Kerr*), circiter 4 cm. longa, apice 1 cm. diametro, extra parce pilosula. *Filamenta* 8 mm. longa, glabra. *Ovarium* 1·6 cm. altum, cum stylo 9 mm. longo glanduloso-pubescens. *Capsula* ad 5 cm. longa, 2 mm. diametro.

Chiengmai, on rocks near a stream on Doi Sootep, 540 m., *Kerr*, 769.

The genus *Streptocarpus* has not, so far as the writer is aware, yet been recorded from Eastern Asia. The plant described above belongs to the section *Caulescentes* of Fl. Trop. Afr., iv. p. 504.

Boea divaricata, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 75.
Kedah, Langkawi, Ayer Hangat, *Curtis*, 3683.

Boeica brachyandra, *Ridley*, Journ. Str. Br. R. As. Soc., xliv. p. 78.
Kedah, Langkawi, (ex *Ridley*, l.c.).

Bignoniaceae.

Millingtonia hortensis, *Linn. f.*—F.B.I., iv. p. 377; For. Fl. Burma, ii. p. 238.
Banks of Meh Ping, *Hosseus*, 168; Phre, *Luang Vanpruk*, 134.
Distr. India, Malaya.

Dolichandrone Rheedii, *Seem.*—F.B.I., iv. p. 379. *Spathodea Rheedii*, Wall.—For. Fl. Burma, ii. p. 234.
Paknampo, *Witt*, 15.
Distr. India, Malaya, Polynesia.

Markhamia stipulata, *Seem.* ? *Dolichandrone stipulata*, Benth.—F.B.I., iv. p. 379. *Spathodea stipulata*, Wall.—For. Fl. Burma, ii. p. 234.
Lakon, near Hang Sut, in deciduous jungle, 360 m., *Kerr*, 1013.
Distr. Burma.
Lao name, Kaa Hua Moo.
The indumentum of the fruit is rather that of *M. cauda-felina* but the seeds and flower are of *M. stipulata*.

Stereospermum chelonoides, *DC.*—F.B.I., iv. p. 382; For. Fl. Burma, ii. p. 230; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 102.
Chiengmai, Doi Sootep, 600 m., *Kerr*, 1167.
Distr. India, Burma, Yunnan, Java (?), Trinidad, (cult.).

Stereospermum fimbriatum, *DC.*—F.B.I., iv. p. 383; For. Fl. Burma, ii. p. 231.
Tongkah (Junkseylon), *Curtis*, 2912.
Distr. Burma, Malay Peninsula.

Stereospermum neuranthum, *Kurz*—F.B.I., iv. p. 382; For. Fl. Burma, ii. p. 230.
Chiengmai, in deciduous jungle on Doi Sootep, 840 m., *Kerr*, 1128.
Distr. Burma.
The indumentum of the calyx is not so dense as in Kurz's type specimens but is exactly that of Parish's Moulmein plants.

Radermachera sp. n.
Bangkok, Legation Garden, *Paget*.
A very distinct plant on account of its densely warted calyx but unfortunately not sufficiently represented for description.

Martyniaceae.

Martynia annua, *Linn.* *M. diandra*, Glox.—F.B.I., iv. p. 386, *in nota*.
Chiengmai, on waste ground, 300 m., *Kerr*, 779.
Introduced from Trop. America.

Acanthaceae.*†

Thunbergia similis, *Craib*, sp. n., a *T. fragrante*, Roxb., foliis integris basi cuneatis vel obtusis breviter petiolatis distinguenda.

Herba repens vel scandens ; caules monocarpici, quadrangulares, pilis reflexis rigidiusculis parce instructi. *Folia* infima elliptico-lanceolata, suprema lanceolata, apice obtusa vel acutiuscula, apiculata, basi plerumque cuneata vel obtusa, 1·8–8 cm. longa, 1–3·1 cm. lata, rigide chartacea, supra pilis paucis rigidis scabridula, subtus fere glabra, margine integra, nervis lateralibus utrinque 4–6 intra marginem arcuatis duobus basalibus valde obliquis utrinque subprominulis, petiolis circiter 0·5 cm. longis suffulta. *Flores* albi, axillares, gemini, pedicellis vix 3 cm. attingentibus suffulti ; bracteolae sub anthesin liberae, oblongo-lanceolatae, apice acutae, 1·1–1·4 cm. longae, 0·5 cm. latae, dorso parce pubescentes et apices versus pauci-ciliatae. *Calycis* lobi lanceolati vel late lanceolati, acuti, breviter pilosuli. *Corollae* albae tubus 2·2 cm. longus, 2·5 mm. diametro, superne parce pubescens, lobi obcordati, 1·8 cm longi, 1·8 cm. lati, ciliati. *Antherae* 3 mm. longae, connectivo apice producto.

Chiengmai, Doi Sootep, 300–900 m., *Kerr*, 753.

Thunbergia Hossei, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 64.

Chiengmai, Doi Sootep, 660–700 m., *Hosseus*, 276, *Kerr*, 513.

Distr. Upper Burma, Ruby Mines, *Lace*, 5220.

Thunbergia laurifolia, *Lindl.*—F.B.I., iv. p. 392 ; For. Fl. Burma, ii. p. 240 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 103 ; Hosseus, Engl. Bot. Jahrb., xli. p. 64.

Between Lakon and Phre, near Ban Meh Tah, 300 m., *Kerr*, 987.

Distr. Malay Peninsula N. to Arracan.

Lao name, Dauk Nam Naa.

Staurogyne obtusa, *O. Kze. Ebermaiera obtusa*, T. And.—F.B.I., iv. p. 401. *Dracocephalum longipedicellatum*, Muschler, Fedde Rep. Nov. Sp., iv. p. 269.

Meh Ping, Chieng Dao, in evergreen jungle, 420 m., *Kerr*, 1054 ; between Wann Bao and Chieng Dao, 450 m., *Hosseus*, 464.

Distr. Mergui, Moulmein.

The Siamese plant is somewhat different from the Burmese in its slightly denser racemes and rather larger flowers and leaves.

Staurogyne setigera, *O. Kze. Ebermaiera setigera*, Nees—F.B.I., iv. p. 398. *E. subcapitata*, C. B. Clarke, Bot. Tidsskr., xxiv. p. 348.

Koh Chang, *Schmidt*, 271.

Distr. Malaya.

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* *See* Hosseus, "Die aus Siam bekannten Acanthaceen," Engl. Bot. Jahrb., xli. (1908), pp. 62–73.

† After the mss. of *Styracaceae—Gesneraceae* had gone to press a paper by Mr. H. N. Ridley on the Flora of Lower Siam has been received (Journ. Str. Br. Roy. As. Soc., 59 pp. 15–234). As Mr. Ridley has had more copious material from Lower Siam than is at present available in the Kew Herbarium it has been decided to omit all records from south of the Isthmus of Kra in dealing with the remaining orders (commencing at *Acanthaceae*).

Staurogyne siamensis, *C. B. Clarke*, Bull. Herb. Boiss., v. (1905) p. 716 ; Hosseus, Engl. Bot. Jahrb., xli. p. 65.
Raheng, *Lindhard*, 25.

Ophiorrhiziphyllon macrobotryum, *Kurz*—F.B.I., iv. p. 403.
Chiengmai, in dense evergreen jungle on Doi Sootep, 1650 m., *Kerr*, 1678.
Distr. Burma.

Nelsonia campestris, *Br.*—F.B.I., iv. p. 394 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 103 ; Hosseus, Engl. Bot. Jahrb., xli. p. 64.
Pang Pooey, 420 m. *Kerr*, 982 ; Doi Kum, 360 m., *Kerr*, 1657 ; Chiengmai, 300 m., *Hosseus*, 443 ; Doi Sootep, 1050 m., *Hosseus*, 490.
Distr. S.E. Asia, Australia, Africa, America.
The plants quoted above belong to the large leaved form (*N. vestita*, R. & S., *Justicia tomentosa*, Roxb.). The plant collected at Bangkok by Schomburgk (No. 192) belongs rather to the typical form as enumerated by Williams, Bull. Herb. Boiss., v. (1905) p. 435.

Cardanthera avana, *Benth.*—F.B.I., iv. p. 405 ; Hosseus, Engl. Bot. Jahrb., xli. p. 65.
Chiengmai, 300 m., *Hosseus*, 176.
Distr. Burma.
Lao name, Dog Nja Djong Fuang (ex *Hosseus*, l.c.).

Daedalacanthus tetragonus, *T. And.*—F.B.I., iv. p. 420 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 103 ; Williams, Bull. Herb. Boiss., v. (1905) p. 962 ; Hosseus, Engl. Bot. Jahrb., xli. p. 68.
Chiengmai, Doi Sootep, 660–900 m., *Kerr*, 948 ; between Wann Bao and Chieng Dao, 400 m., *Hosseus*, 389 ; Raheng, between Long Ison and Nong Boa, *Lindhard*, 52.
Distr. Burma.

Hemigraphis Schomburgkii, *Craib*, sp. n., ab *H. flava*, Kurz, foliis lanceolatis facile distinguenda.
Folia lanceolata, apice acuminata, basi in petiolum brevem attenuata, 5·5–12·5 cm. longa, 1–2 cm. lata, rigide chartacea, utrinque glabra et lineolata sed pagina superiore quam inferiore densius lineolata, margine integro recurvo, nervis lateralibus utrinque 6–7 pagina utraque prominulis nervis transversis supra subprominulis. *Capitula* et terminalia et ramulos breves axillares terminantia, 1·5–2 cm. longa, 1·5 cm. diametro, pluriflora ; bracteae ovato-lanceolatae, obtusiusculae, 1·2 cm. longae, 0·6 cm. latae, utrinque puberulae et extra inferne pilosae, ciliatae, nervis distinctis ; bracteolae parvae, lanceolatae, acutae, pilosae. *Calycis* segmenta lineari-lanceolata, acutiuscula, 1 cm. longa, 1·5 mm. lata, extra puberula, intra appresse albo-pubescentia, ciliata, superne longe ciliata. *Corolla* tubuloso-campanulata, circiter 2·5 cm. longa, apice 1 cm. diametro, extra parce pilosula, intra dorse praecipue longe pilosa ; lobi 5, subaequales, rotundati. *Filamenta* longiora valde barbata, breviora parce pilosa. *Ovarium* glabrum, 8-ovulatum ; stylus parce pubescens.—*H. flava*, Williams, Bull. Herb. Boiss., v. (1905) p. 436, *non* Kurz.
Bangkok, *Schomburgk*, 145.

Strobilanthes anfructuosus, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 66.

Doi Intanon, 1150 m., *Hosseus*, 336.

Lao name, Dog Hom Ba (ex *Hosseus*, l.c.).

Karen name, Bed Jau Po (ex *Hosseus* l.c.).

Strobilanthes consors, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 66.

Chiengmai, Doi Sootep, 1680 m., *Hosseus*, 256; Muang Fang (ex *Hosseus*, l.c.).

Strobilanthes erectus, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 67.

Doi Chieng Dao (ex *Clarke*, l.c.).

Strobilanthes Hossei, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 67.

Doi Intanon, 1600 m., *Hosseus*, 339.

Strobilanthes imbricatus, *Nees*—F.B.I., iv. p. 455; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 104.

Chiengmai, Doi Sootep, in evergreen jungle, 1500 m., *Kerr*, 884.

Distr. Burma.

Strobilanthes lilacinus, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 67.

Doi Chieng Dao, 2160 m., *Hosseus*, 402a.

Strobilanthes pentstemonoides, *T. And.*—F.B.I., iv. p. 460; Hosseus, Engl. Bot. Jahrb., xli. p. 67.

Chiengmai, Doi Sootep, 600–1680 m., *Hosseus*, 244, *Kerr*, 935.

Distr. Nepal, Bhotan, China.

Kerr's plant does not match any of the Indian specimens referred to this species but appears to be rather a well marked form with narrow and more rigid leaves.

Strobilanthes rex, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 68.

Doi Intanon, 2500 m., *Hosseus*, 352.

Strobilanthes siamensis, *C. B. Clarke*, Bull. Herb. Boiss., v. (1905) p. 716; Williams, Bull. Herb. Boiss., v. (1905) p. 962; Hosseus, Engl. Bot. Jahrb., xli. p. 68, *excl.* F.B.I. reference.

Klong Wang Djao, from Long Ison to Nong Boa, *Lindhard*, 55; Chiengmai, Doi Sootep, 450–1000 m., *Kerr*, 927, *Hosseus*, 251.

Strobilanthes xanthostictus, *C. B. Clarke apud Hosseus*, Engl. Bot. Jahrb., xli. p. 68.

Banks of Meh Ping, Wann Bao, (ex *Clarke*, l.c.).

Strobilanthes, sp. n.?

Phre, Hooey Kamin, 300 m., *Kerr*, 988.

Not matched at Kew but I hesitate to describe as a new species since there are a few species described recently from Siam which I have not seen and of which the published descriptions are rather scanty.

Gutzlaffia pedunculata, *Craib*, sp. n., a *G. aprica*, Hance, capitulis haud sessilibus facile distinguenda.

Suffrutex ad 1·2 m. altus (ex *Kerr*); caules teretes, stricti, pilis brevibus sparsis scabriduli. *Folia* breviter petiolata, lanceolata vel

ovato-lanceolata, apice acuta, basi obtusa, 3·5–7 cm. longa, 1–2·4 cm. lata, subcoriacea, margine integro recurvo, supra scabrida, subtus albo-lanata, nervis lateralibus obliquis utrinque 7 supra conspicuis subtus prominulis nervis transversis obscuris. *Capitula* pauciflora, pedunculis (ramulis axillaribus) 2–6 cm. longis suffulta ; bracteae conspicuae, calycem paulo excedentes, lanceolatae, acutae, ciliatae. *Calyx*, 1·3 cm. longus, fere ad medium lobatus, lobis inaequalibus lineari-lanceolatis acutis 1 mm. latis ciliatis. *Corollae* purpureae pars infima aequalis 2 cm. longa, 1 mm. diametro, pars expansa 2 cm. longa, 1·3 cm. diametro. *Filamenta* 1·2 cm. longa, basi pubescentia. *Stylus* breviter pubescens.

Chiengmai, in eng jungle on Doi Sootep, 360–450 m., *Kerr*, 1430.

Barleria cristata, *Linn.*—F.B.I., iv. p. 488 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 105 ; Hosseus, Engl. Bot. Jahrb., xli. p. 69.

Bangkok, *Zimmermann*, 19 ; Siamese Frontier, 360 m., *Candler* ; Wang Djao, *Hosseus*, 80 ; Chiengmai, Doi Sootep, 300–900 m., *Kerr*, 815.

Distr. S.E. Asia—often cultivated.

Barleria lupulina, *Lindl.*—F.B.I., iv. p. 482, *in nota.*

Bangkok, *Lawson.*

Cultivated in S.E. Asia.

Lao name, Salate phang poru (ex *Lawson*).

Used by the natives as a remedy for snake bites (*Kew Bull.*, 1909, pp. 156 et 343).

Barleria siamensis, *Craib*, sp. n., ob caules pilis deflexis strigosos, folia supra pilis paucis conspicuis distantibus rigidis instructa subtus costa nervisque praecipue molliter pubescentia distincta.

Suffrutex sarmentosus, usque ad 1·2 m. altus (ex *Kerr*) ; caules pilis deflexis densius strigosi. *Folia* elliptica, elliptico-oblanceolata vel oblanceolata, apice longe acuminata, acuta, basi cuneata, 19–22 cm. longa, 5·5–7·5 cm. lata, chartacea, supra pilis paucis distantibus conspicuis rigidis instructa, subtus costa nervisque praecipue molliter pubescentia, nervis lateralibus utrinque 7 supra conspicuis subtus prominulis ; petioli 1–1·5 cm. longi, pubescentes. *Calycis* segmenta 4, segmentum posticum ovatum, acutum, 3·5 cm. longum, 2 cm. latum, anticum ovato-lanceolatum, apice emarginatum, 3·1 cm. longum, 1·5 cm. latum, utrumque membranaceum, margine irregulariter dentato-ciliatum, nervis distinctis, segmenta lateralia 1·7 cm. longa, 1·5–2 mm. lata, apice bene attenuata, ciliata. *Corolla* purpurea (ex *Kerr*), longe exserta, extus parce puberula. *Discus* fere 1 mm. altus, margine subintegro. *Ovarium* 3·5 mm. altum, cum stylo glabrum.

Chiengmai, in evergreen jungle by a stream on Doi Sootep, 690 m., *Kerr*, 1415.

Barleria strigosa, *Willd.*—F.B.I., iv. p. 489 ; Hosseus, Engl. Bot. Jahrb., xli. p. 69.

Chiengmai, Doi Sootep, 300–750 m., *Kerr*, 822 ; Wang Djao, *Hosseus*, 81.

Distr. S.E. Asia—often cultivated.

Neuracanthus tetragonostachyus, *Nees*—F.B.I., iv. p. 491.
Chiengmai, Doi Kum, 360 m., *Kerr*, 1655.
Distr. Burma.

Asystasiella Neesiana, *Lindau*. *Asystasia Neesiana*, Nees—F.B.I., iv. p. 496 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 105. *A. chinensis*, S. Moore—Hosseus, Engl. Bot. Jahrb., xli. p. 70.
Chiengmai, in evergreen jungle on Doi Sootep, 420 m., *Kerr*, 1400 ; Wang Djao, Koh Yai, 110 m., *Hosseus*, 94.
Distr. Assam, Burma, China, Tonkin.

Asystasia Kerrii, *Craib*, sp. n., ab *A. macrocarpa*, Nees, bracteis conspicuis, sepalis 1·1 cm. longis recedit.

Suffrutex sarmentosus ; caules 3–5 mm. diametro, primo parce brunneo-puberuli, mox glabri, cortice brunneo vel rubro-brunneo obtecti. *Folia* opposita inaequalia, ovato-elliptica, ovato-lanceolata vel lanceolata, apice acuminata vel subacuminata, acuta, basi acuminata vel cuneata, 6–19 cm. longa, 1·5–7·3 cm. lata, utrinque fere glabra, nervis lateralibus utrinque 6–9 supra conspicuis subtus prominulis, petiolis ad 2 cm. longis suffulta. *Racemi* terminales, 3·5–8 cm. longi ; bracteae oblongo-oblanceolatae, apice breviter acuminatae, 7 mm. longae, 1·5–2 mm. latae, nervis conspicuis. *Sepala* 4, unum aliis paulo latius, 11 mm. longa, 1·5–2 mm. lata, ut in bracteis glanduloso-pubescentia. *Corolla* alba purpureo-picta (ex *Kerr*), 2·5 cm. longa, parte basi cylindracea 7 mm. longa 3 mm. diametro, parte inflata 7 mm. diametro, extus puberula ; lobi 5, subaequales. *Stamina* 4, filamentis ad 1 cm. longis glabris ; antherarum loculi subaequales, circiter 2·5 mm. longi, uno paulo altuis affixo, basi mucronati. *Ovarium* parce hirsutum, pilis deciduis ; stylus inferne pilis divergentibus parce instructus.

Chiengmai, in evergreen jungle by a stream on Doi Sootep, 690 m., *Kerr*, 537 ; hills between Muang Prow and Chieng Dao, 600 m., in evergreen jungle by a stream, *Kerr*, 1042.

Eranthemum Parishii, *C. B. Clarke*—F.B.I., iv. p. 499 ; Hosseus, Engl. Bot. Jahrb., xli. p. 70.
Chiengmai, Doi Sootep, 720–750 m., *Kerr*, 938, *Hosseus*, 267 ; Pitsanulok, Nakontai, 300 m., *Hosseus*, 722a.
Distr. Moulmein, Tenasserim.

Cystacanthus abbreviatus, *Craib*, sp. n., a *C. paniculato*, T. And., cui affinis, foliis basi longius attenuatis, petiolis longioribus, panicula brevi, calycis indumento breviore, corollae indumento sparsiore recedit.

Suffrutex sarmentosus, vix 1 m. altus (ex *Kerr*) ; ramuli primo teretes, virides, puberuli, mox tetragoni, straminei, minute scaberuli. *Folia* oblanceolata vel obovato-oblanceolata, apice breviter acuminata, obtusa, basi attenuata, ad 15 cm. longa, 5 cm. lata, chartacea, margine integro, supra glabra, subtus costa nervisque puberula, nervis lateralibus utrinque circiter 6 obliquis supra subprominulis subtus cum nervis transversis prominulis ; petioli usque ad 3·5 cm. longi. *Flores* in paniculam terminalem angustam abbreviatam dispositi ; bracteae parvae, deciduae ; pedicelli circa 3 mm. longi. *Calycis* segmenta lineari-lanceolata, subobtusa, 7 mm. longa, 1·5 mm. lata, extra appresse strigillosa, intra ut extra sed parcius, pilis glanduloso-capitatis ciliata. *Corolla* purpurea (ex *Kerr*), corollae

C. paniculati similis nisi indumento extra parciore. *Stamina* 2, filamentis 12·5 mm. longis ima basi hirsutis, antheris oblongis, connectivo breviter glanduloso-hirsuto. *Ovarium* circiter 2 mm. altum, glabrum, stylo superne glabro inferne pilis perpaucis breviusculis patulis instructo.

Lakon, Hooey Meh Tah, by a stream, 600 m., *Kerr*, 1019.

Phlogacanthus asperulus, *Nees*—F.B.I., iv. p. 512.

Meh Ping, Chieng Dao, in evergreen jungle, 420 m., *Kerr*, 1053.

Distr. Bengal, Assam, China.

Kerr's plant is identical with Simon's Khasia specimens but I do not feel sure these are quite typical.

Phlogacanthus curviflorus, *Nees*, var. **brevicalyx**, *C. B. Clarke*—F.B.I., iv. p. 511.

Chiengmai, on marshy ground in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 957.

Distr. (of var.) Lower Burma.

The plant enumerated by Hosseus, Engl. Bot. Jahrb., xli. p. 69, as *P. curviflorus* from the same locality is probably identical with Kerr's plant. The calyx teeth in *Kerr*, 957, are slightly longer than in Clarke's types of var. *brevicalyx* but shorter than in true *curviflorus* and the calyx is nearly glabrous on the outside as in the variety.

Phlogacanthus Murtoni, *Craib*, sp. n., a *P. pubinervio*, T. And. et *P. Jenkinsii*, C. B. Clarke, quibus affinis, calyce 3 mm. tantum longo recedit.

Folia oblanceolata, apice acuminata, basi inaequalia, acuminata vel in petiolum attenuata, 9–15·5 cm. longa, 3·7–4·6 cm. lata, chartacea, utrinque glabra, nervis lateralibus utrinque circiter 9 supra conspicuis subtus prominulis nervis transversis utrinque subobscuris ; petioli ad 1 cm. longi. *Racemi* axillares, oppositi, ad 1·5 cm. longi, glabri ; bracteae lineares, parvae ; bracteolae minutae, pedicello infra medium affixae ; pedicelli ad 8 mm. longi. *Calycis* 3 mm. longi segmenta lineari-lanceolata, acuta. *Corolla* 2·2 cm. longa, glabra nisi lobis intra minute papillosis. *Stamina* exserta ; filamenta 1·4 cm. longa, glabra vel basi pauperrime pilulosa ; antherae 2 mm. longae. *Ovarium* cum stylo glabrum. *Capsula* circiter 3 cm. longa.

Kow Hoo Wen, *Murton*, 68.

Lepidagathis incurva, *Don*—Hosseus, Engl. Bot. Jahrb., xli. p. 71. *L. hyalina*, Nees—F.B.I., iv. p. 521.

Chiengmai, Doi Sootep, 960 m., *Kerr*, 953, at 1200 m., *Hosseus*, 261 ; Bangkok, *Schomburgk*, 162.

Distr. S.E. Asia.

Lepidagathis incurva, *Don*, var. **semiherbacea**, *C. B. Clarke*, F.B.I., iv. p. 521.

Chiengmai, in mixed jungle, 330 m., *Kerr*, 1660.

Distr. Sikkim, Assam, Burma.

Lepidagathis parviflora, *Blume*.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 960.

Distr. Java, Tonkin.

Clinacanthus Burmanni, *Nees*—F.B.I., iv. p. 524.

Near Chantaboon, *Murton*, 61.

Distr. Hainan, Malacca, Borneo.

Justicia bicalcarata, *Craib*, sp. n., a *J. montana*, Wall., antherarum loculis omnibus distincte calcaratis recedit.

Suffrutex sarmentosus, ? scandens (ex *Kerr*). *Folia* ovato-lanceolata vel elliptica, apice acuminata, obtusa, basi obtusa vel rotundata, 4·5–16 cm. longa, 1·6–10 cm. lata, chartacea, margine subintegro, supra glabra, subtus primo dense mollissime mox costa nervisque praecipue molliter pubescentia, nervis lateralibus utrinque 7 supra conspicuis subtus prominulis ; petioli 1–3 cm. longi. *Racemi* vel terminales tantum vel etiam in axillis supremis ; bracteae late oblanceolatae, apice breviter acute acuminatae, 8 mm. longae, 4 mm. latae. *Calycis* segmenta lineari-lanceolata, acuta, 8 mm. longa, 1·5 mm. lata, utrinque breviter appresse fulvo-pubescentia. *Corolla* alba (ex *Kerr*), 2·5 cm. longa, distincte bilabiata ; labium superum oblongum, apice emarginatum, 1·5 cm. longum, 8 mm. latum, utrinque superne pilosulum et intra basi pilosum, inferum vix ad medium 3-lobatum, lobis superne utrinque pilosulis. *Filamenta* circiter 1·4 cm. longa, inferne barbata ; antherae biloculares, loculo quoque basi calcarato. *Stylus* inferne ut in ovario parce pubescens.

Near Muang Phre, 300 m., *Kerr*, 993.

Lao name, Dauk Mohlah.

Justicia diffusa, *Willd.*—F.B.I., iv. p. 538. *J. diffusa*, Willd., var. *orbiculata*, Williams, Bull. Herb. Boiss., v. (1905) p. 436, pro parte ; Hosseus, Engl. Bot. Jahrb., xli. p. 71, pro parte.

Anhin, *Schomburgk*, 253.

Var. **orbiculata,** *C. B. Clarke*, F.B.I., l.c. ; Williams, l.c., pro parte ; Hosseus, l.c., pro parte.

Anhin, *Schomburgk*, 273.

Distr. India.

Justicia fragilis, *Wall.*—F.B.I., iv. p. 528. *J. Gendarussa*, Williams, Bull. Herb. Boiss., v. (1905) p. 436 ; Hosseus, Engl. Bot. Jahrb., xli. p. 72—at least in part—*non* Linn. f.

Bangkok, *Schomburgk*, 140.

Distr. Mergui, Tonkin.

Justicia Gendarussa, *Linn. f.*—F.B.I., iv. p. 532 ; For. Fl. Burma, ii. p. 247 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 106 ; Williams, Bull. Herb. Boiss., v. (1905) p. 436 et Hosseus, Engl. Bot. Jahrb., xli. p. 72, *excl.* planta Schomburgkiana.

Bangkok, *Lawson*, *Zimmermann*, 126 ; between Raheng and Paknampo, 105 m., *Kerr*, 501 ; Chiengmai, foot of Doi Sootep, 360 m., *Kerr*, 529 ; Phre, 180 m., *Luang Vanpruk*, 192 ; Koh Chang, *Schmidt*, 820.

Distr. China and Malay Archipelago to Africa.

Lao name, Bua Ha (ex *Luang Vanpruk*).

Used by the natives as a remedy for snake bites (*Kew Bull.*, 1909, pp. 156 et 343).

Justicia khasiana, *C. B. Clarke*, F.B.I., iv. p. 437 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 106.

Doi Chieng Dao, 2170 m., *Hosseus*, 403.

Distr. Khasia, Upper Burma.

This plant agrees with the specimen referred to *J. khasiana* by Coll. and Hemsl., l.c. and differs but slightly from the type in the rather broader leaves and less hispid stem.

Justicia procumbens, *Linn.*—F.B.I., iv. p. 539; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 106; Hosseus, Engl. Bot. Jahrb., xli. p. 72.

Chiengmai, Doi Sootep, 300–700 m., *Kerr*, 1368, *Hosseus*, 279; Raheng, Tapotsah, *Lindhard*, 25; Kau Phra Dang, *Hosseus*, 159.

Distr. S.E. Asia to Australia.

The Siam plant belongs to the form *latispica*, C. B. Clarke, F.B.I., l.c.

Justicia quadrifaria, *Wall.*—F.B.I., iv. p. 530; Hosseus, Engl. Bot. Jahrb., xli. p. 72. *J. Zollingeriana*, C. B. Clarke, F.B.I., iv. p. 530.

Chiengmai, Doi Sootep, 1200–1680 m., *Kerr*, 1101, 1287, *Hosseus*, 228.

Distr. S. China, Burma, Assam, Java.

Justicia quinqueangularis, *Koen.*—F.B.I., iv. p. 536.

Chiengmai, edge of paddy fields, 300 m., *Kerr*, 803.

Distr. Central India to Bengal.

Justicia ventricosa, *Wall.*—F.B.I., iv. p. 526; Williams, Bull. Herb. Boiss., v. (1905) p. 436; Hosseus, Engl. Bot. Jahrb., xli. p. 72.

Between Lakon and Phre, near Ban Meh Tah, 300 m., *Kerr*, 994; Chantaboon, *Murton*, 70.

Distr. Burma, S. China.

Adhatoda Vasica, *Nees*—F.B.I., iv. p. 540; Hosseus, Engl. Bot. Jahrb., xli. p. 72.

Doi Saket, Ban Sun Pah Suk, 600 m., *Kerr*, 1025; Bangkok, *Schomburgk*, 153.

Distr. E. Asia.

Rungia parviflora, *Nees* — F.B.I., iv. p. 550; Williams, Bull. Herb. Boiss., v. (1905) p. 437; Hosseus, Engl. Bot. Jahrb., xli. p. 71.

Tapotsah, *Lindhard*, 7; near Ban Takilek, 300 m., *Hosseus*, 323.

Var. **pectinata**, *C. B. Clarke*, F.B.I., l.c.; Hosseus, l.c.

Chiengmai, Doi Sootep, in deciduous jungle, 600 m., *Kerr*, 1426; banks of Meh Ping, opposite Ban Salu, 350 m., *Hosseus*, 383.

Distr. India, China, Indo-China.

Dicliptera riparia, *Nees*—F.B.I., iv. p. 553; Hosseus, Engl. Bot. Jahrb., xli. p. 71.

Ban Takilek, 300 m., *Hosseus*, 322.

Distr. Lower Burma.

Lao name, Dog Gambong Ba (ex *Hosseus*, l.c.).

Dicliptera Roxburghiana, *Nees*—F.B.I., iv. p. 553.

Chiengmai, 300 m., *Kerr*, 1632—"a garden weed."

Distr. N. India, Assam.

Peristrophe lanceolaria, *Nees*—F.B.I., iv. p. 555; Hosseus, Engl. Bot. Jahrb., xli. p. 71.

Chiengmai, Doi Sootep, 700–800 m., *Kerr*, 921, *Hosseus*, 271; Pitsanulok, Nakontai, 150–200 m., *Hosseus*, 721.

Distr. Assam, Burma.

Verbenaceae.

Lantana Camara, *Linn.*—F.B.I., iv. p. 562, *in nota*. ? *L. mixta*, Linn.—For. Fl. Burma, ii. p. 253.

Chiengmai, on waste ground, 300 m., *Kerr*, 711 ; Bangkok, *Zimmermann*, 33, 170 ; collected on a journey from Tavoy to Bangkok, "very common Siamese plant," *Candler*.

Distr. Tropics.

Lantana indica, *Roxb.*—F.B.I., iv. p. 562; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 109.

Meh Ping, Muang Hawt, 240 m., *Kerr*, 2014.

Distr. Trop. Asia.

Duranta Plumieri, *Jacq.*

Bangkok, *Zimmermann*, 11, 159.

Native of America—often cultivated in the Tropics.

Callicarpa arborea, *Roxb.*—F.B.I., iv. p. 567 ; For. Fl. Burma, ii. p. 274 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 109.

Chiengmai, Doi Sootep, 900 m., *Kerr*, 691.

Distr. India, Burma, Assam, Yunnan, Malaya.

Lao name, Suk ki kai (ex *Kerr*).

Callicarpa cana, *Linn.*—F.B.I., iv. p. 568 ; Williams, Bull. Herb. Boiss., v. (1905) p. 430.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1226 ; Cape Ngob, *Schmidt*, 5.

Distr. Hainan, Malaya, Philippines, Indies.

Tectona grandis, *Linn. f.*—F.B.I., iv. p. 570 ; For. Fl. Burma, ii. p. 259 ; Williams, Bull. Herb. Boiss. v. (1905) p. 430.

Chiengmai, Doi Sootep, in mixed jungle, 330 m., *Kerr*, 1297.

Distr. India, Burma, Malaya—often cultivated.

Lao name, Mai Suk.

Premna fulva, *Craib*, sp. n., affinis *P. barbatae*, Wall., sed ramulis novellis petiolisque conspicue fulvo-pubescentibus facile distinguenda.

Suffrutex sarmentosus ? vel scandens (ex *Kerr*) ; ramuli juventute conspicue fulvo-pubescentes, striati, mox fere glabri, cortice rubro-brunneo obtecti. *Folia* variabilia, ovata, oblongo-ovata, oblongo-obovata, ovato-lanceolata vel subelliptica, apice acuminata, acuta, rarissime rotundata, basi late cuneata, rotundata vel subcordata, 4–14·5 cm. longa, 2·8–8·5 cm. lata, chartacea, margine irregulariter crenato-serrata, nonnunquam integra, supra pilis paucis rigidiusculis flavis instructa, subtus molliter pubescentia, nervis lateralibus utrinque 5–6 obliquis pagina superiore conspicuis inferiore prominentibus nervisque transversis prominulis ; petioli foliorum oppositorum parum inaequales, 2–5·5 cm. longi, ut in ramulis fulvo-pubescentes. *Cymae* in corymbas terminales ad 6 cm. longas et 9 cm. latas dispositae ; bracteae lineares, acutae, infimae ad 7 mm. longae. *Calyx* subbilabiatus, 2·5 mm. longus, 2·5 mm. diametro, lobis subaequalibus brevibus apice rotundatis. *Corollae* viridis tubus circiter 2 mm. longus, intus superne villosus ; labium posticum oblongum, vix retusum, 2 mm. longum, vix 2 mm. latum, inferum 3-lobatum, lobis apice rotundatis. *Filamenta* ad 2·5 mm. longa.

glabra. *Ovarium* globosum, 1 mm. diametro, apice pilis paucis erectis instructum ; stylus 4 mm. longus, apice breviter bifidus, glaber.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1085.

Premna herbacea, *Roxb.*—F.B.I., iv. p. 581.

Chiengmai, in deciduous jungle on Doi Sootep, 330–600 m., *Kerr*, 1218.

Distr. Himalayas, Assam, (S. Deccan Peninsula, ex F.B.I., l.c.).

Premna nana, *Coll. et Hemsl.*, Journ. Linn. Soc., xxviii. p. 109.

Chiengmai, Doi Sootep, in deciduous jungle, 300–600 m., *Kerr*, 1127.

Distr. Upper Burma.

Gmelina arborea, *Linn.*—F.B.I., iv. p. 581 ; For. Fl. Burma, ii. p. 264 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 110.

Chiengmai, Doi Sootep, 690–900 m., *Kerr*, 540, *Hosseus*, 576 (as to flowers only—the leaves being evidently those of *Columbia floribunda*, Wall., Herb. Kew ! et Copenhagen !).

Distr. S.E. Asia.

Vitex canescens, *Kurz*—F.B.I., iv. p. 586 ; For. Fl. Burma, ii. p. 270 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 110.

Phre, 120–180 m., *Luang Vanpruk*, 143 ; Chiengmai, 300 m., *Kerr*, 1705 ; Doi Sootep, 330 m., *Kerr*, 1766.

Distr. Assam, Burma, Yunnan.

Vitex limonifolia, *Wall.*—F.B.I., iv. p. 584 ; For. Fl. Burma, ii. p. 271 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 110 ; Williams, Bull. Herb. Boiss., v. (1905) p. 431.

Phre, 150–240 m., *Luang Vanpruk*, 184 ; Meh Ping, Doi Noi, 300 m., *Kerr*, 2011.

Distr. Burma.

Lao name, Tin Nok.

Vitex peduncularis, *Wall.*—F.B.I., iv. p. 587.

Chiengmai, in mixed jungle at foot of Doi Sootep and in deciduous jungle on lower slopes of Doi Sootep, 300–450 m., *Kerr*, 572 ; Phre, 156–240 m., *Luang Vanpruk*, 122.

Distr. Bengal, Assam, Burma.

Vitex trifolia, *Linn.*—F.B.I., iv. p. 583 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 110. *V. Agnus-castus*, Linn., var. *trifolia*, Kurz, For. Fl. Burma, ii. p. 270.

Chiengmai, in scrub jungle, 330 m., *Kerr*, 1248 ; Rayong, *Schmidt*.

Distr. India to Japan and southwards to N. Australia.

Schmidt's plant is typical var. *unifoliata* but some of Dr. Kerr's specimens show trifoliolate associated with unifoliolate leaves on the same branches.

Vitex sp.

Me Yuak Phre, 240 m., *Luang Vanpruk*, 241—very young.

Clerodendron Colebrookianum, *Walp.*—F.B.I., iv. p. 594.

Chiengmai, on the edge of a clearing on Doi Sootep, 720 m., *Kerr*, 812.

Distr. S.E. Asia.

Clerodendron Garrettianum, *Craib*, sp. n., ab affini *C. Fortunei*, Hemsl., foliis basi haud attenuatis, panicula subnutante, corollae extus puberulae tubo gracili 2 cm. tantum longo, lobis usque ad 1 cm. longis recedit.

Suffrutex sarmentosus, ad 1·2 m. altus (ex *Kerr*) ; ramuli graciles, primo puberuli, mox glabri, cortice brunneo vel rubro-brunneo obtecti. *Folia* oblonga vel oblongo-lanceolata, apice acuminata, acuta, basi plerumque latissime cuneata sed interdum cuneata, cuneato-rotundata vel truncato-subcordata, parum inaequalia, 5·5–19 cm. longa, 1·5–5·8 cm. lata, tenuiter chartacea, subintegra, ciliolata, supra parcissime setulosa, subtus costa nervisque puberula, nervis lateralibus utrinque 7–9 duobus basalibus plerumpue valde obliquis, supra cum nervis transversis conspicuis subtus prominentibus ; petioli foliorum oppositorum parum inaequales, 0·5–5 cm. longi, supra canaliculati, puberuli. *Panicula* terminalis, subnutans, circa 5 cm. longa, 6 cm. lata, pedunculo communi 2–3 cm. longo suffulta ; bracteae infimae lanceolatae, acuminatae, foliaceae, ad 1·3 cm. longae ; pedicelli ad 8 mm. longi, ut in ramulis novellis puberuli. *Calycis* extra puberuli tubus vix 2 mm. longus, lobi lanceolati, acuti, circa 5 mm. longi et 1·5 mm. lati. *Corollae* albo-viridis extra puberulae tubus 2 cm. longus, vix 1 mm. diametro, lobi subaequales, oblongo-spathulati, usque ad 1 cm. longi et 2·75 mm. lati, ciliolati. *Stamina* apicem versus tubi inserta, filamentis 1·7 cm. longis glabris, antheris oblongis 1·5 mm. longis. *Ovarium* glabrum ; stylus gracilis, 3·2 cm. longus, glaber, apice breviter bifidus.

Chiengmai, in evergreen jungle on Doi Sootep, 690–900 m., *Kerr*, 1309, 1435.

Clerodendron infortunatum, *Gaertn.*—F.B.I., iv. p. 594 ; For. Fl. Burma, ii. p. 267 ; Williams, Bull. Herb. Boiss., v. (1905) p. 432.

Chiengmai, Doi Sootep, 300–750 m., *Kerr*, 1094 ; Bangkok, *Schomburgk*, 106.

Distr. S.E. Asia.

Clerodendron paniculatum, *Linn.*, *?* var. **diversifolia**, *C. B. Clarke*—F.B.I., iv. p. 593.

Chiengmai, Doi Sootep, in deciduous jungle, 300–720 m., *Kerr*, 762.

Distr. (of var.) Moulmein.

Clerodendron serratum, *Spreng.*, var. **Wallichii**, *C. B. Clarke*, F.B.I., iv. p. 592.

Chiengmai, Doi Sootep, *Kerr*, 735, 735a, 754.

On these three collections Dr. Kerr's remarks are as follows :—

735. Small tree about 20 ft. high in evergreen jungle at 3000 ft. (collected 18th July, 1909).

735a. Low thin bush about 3 ft. high, otherwise similar to 735, in evergreen jungle at 3600 ft. (collected same day as 735).

754. Annual shoots about 2–3 ft. high from perennial rootstock in deciduous jungle at 1000–1500 ft. (collected 8th Aug., 1909).

Clerodendron Vanprukii, *Craib*, sp. n., a *C. serrato*, Spreng., calyce haud truncato, bracteis valde diversis recedit.

Ramuli graciles, puberuli, striati. *Folia* elliptico-lanceolata vel ovato-lanceolata, apice acuta, basi in petiolum brevem attenuata, 9–20 cm. longa, 5–9 cm. lata, membranacea vel tenuiter chartacea, profunde irregulariter biserrata, supra puberula, subtus costa nervisque pilosula, nervis lateralibus utrinque circiter 8 intra

marginem arcuatis supra cum nervis transversis conspicuis subtus prominulis. *Panicula* terminalis, circiter 12 cm. longa, 3 cm. diametro ; pedunculi communi oppositi, ad 1·3 cm. longi ; bracteae subrhomboideae, apice rotundatae, ad 2·5 cm. longae et 2·5 cm. latae, margine a medio apicem versus crenato-serratae, ciliatae, rufo-pubescentes.

Phre, Hooey Kamin, 240 m., *Luang Vanpruk*, 207.

Glossocarya mollis, *Wall.*—F.B.I., iv. p. 598 ?

Banks of Menam, *Hosseus*, 5.

Distr. Moulmein.

Hymenopyramis brachiata, *Wall.*—F.B.I., iv. p. 598 ; For. Fl. Burma, ii. p. 258 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 111.

Phre, 120 m., *Luang Vanpruk*, 178 ; Meh Ping, Ban Na, *Kerr*, 2017a ; Muang Hawt, *Kerr*, 2017.

Distr. Burma.

Lao name, Kua Kha pua.

Symphorema involucratum, *Roxb.*—F.B.I., iv. p. 599 ; For. Fl. Burma, ii. p. 254 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 111.

Phre, Hooey Kamin, 180 m., *Kerr*, 991.

Distr. S. India, Burma.

Sphenodesma pentandra, *Jack*—F.B.I., iv. p. 602. *S. Jackiana*, Schauer—Williams, Bull. Herb. Boiss., v. (1905) p. 432. *Symphorema Jackianum*, Kurz, For. Fl. Burma, ii. p. 255.

Meh Ping, Chieng Dao, in evergreen jungle, 390 m., *Kerr*, 1059 ; Chiengmai, in evergreen jungle on Doi Sootep, 750 m., *Kerr*, 1741.

Distr. Burma, Assam, Malaya.

Congea tomentosa, *Roxb.*—F.B.I., iv. p. 603 ; For. Fl. Burma, ii. p. 256 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 111.

Chiengmai, 300 m., *Kerr*, 533, *Hosseus*, 370 ; Phre, 120–180 m., *Luang Vanpruk*, 163.

Distr. Bengal, Burma, Assam.

In the length of the calyx teeth these specimens are intermediate between the type and var. *azurea*, C. B. Clarke.

Labiatae.*

Geniosporum strobiliferum, *Wall.*—F.B.I., iv. p. 610.

Chiengmai, in eng jungle on Doi Sootep, 300–600 m., *Kerr*, 771.

Distr. Himalayas, Assam, Yunnan.

Nosema capitatum, *Prain*, Journ. As. Soc. Beng., lxxiii. p. 20. *Elsholtzia blanda*, Hosseus, Bot. Centralbl., Beihefte xxvii. 2, p. 498, *non* Benth.

Kanburi, *Teysmann* ; Pitsanulok, Ban Jang, 120 m., *Hosseus*, 700.

Orthosiphon rubicundus, *Benth.*—F.B.I., iv. p. 614 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 112.

Chiengmai, in deciduous jungle on Doi Sootep, 300 m., *Kerr*, 655.

Distr. India, Burma.

Kerr's plant is identical with that collected by Collett in the Shan Hills and belongs probably to the form *virgatus* (Benth. pro sp.).

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* In a footnote to the *Labiatae* in Hosseus' paper 'Beiträge Zur Flora Siams' Bot. Centralbl. Berhefte xxvii. 2, it is stated that the determinations of the *Labiatae* are by Dr. Muschler.

Plectranthus hispidus, *Benth.*?—F.B.I., iv. p. 618; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 113. *P. scrophulariioides*, Hosseus, Bot. Centralbl., Beihefte, xxvii. 2 p. 500, *non* Wall.

Chiengmai, Doi Sootep, 1650 m., *Hosseus*, 203.

Distr. Burma, Assam.

Lao name, Kambong (ex *Hosseus*, l.c.).

Plectranthus striatus, *Benth.*—F.B.I., iv. p. 618; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 113; Williams, Bull. Herb. Boiss., v. (1905) p. 430 et Hosseus, l.c. p. 500. p. p. *P. Volkensianus*, Muschler, Fedde Rep. Nov. Sp., iv. p. 268; Hosseus, l.c. p. 500.

Chiengmai, Doi Sootep, 660–1020 m., *Kerr*, 871; Doi Intanon, 500 m., *Hosseus*, 326; (? Siam), *Candler*.

Distr. N. India, Assam, Burma, S. China.

Schomburgk, 120 quoted by Williams and Hosseus under this species is *Ocymum sanctum*, Linn.

Plectranthus ternifolius, *Don*—F.B.I., iv. p. 621; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 113. *P. Hosseusii*, Muschler, Fedde Rep. Nov. Sp., iv. p. 268; Hosseus, l.c. p. 500. *Elsholtzia Thomsoni*, Hook. f.

Chiengmai, Doi Sootep, 1580 m., *Hosseus*, 259; Doi Intanon, 1120 m., *Hosseus*, 334.

Distr. N. India, China, Indo-China.

Pogostemon fraternus, *Miq.*—F.B.I., iv. p. 635. *Stachys scaberula*, Hosseus, l.c. p. 497, *non* Vatke.

Chiengmai, Doi Sootep, 1650–1700 m., *Kerr*, 1646, *Hosseus*, 198.

Distr. Sikkim, Manipur, Java.

Pogostemon glaber, *Benth.*—F.B.I., iv. p. 633.

Chiengmai, Doi Sootep, 1650 m., *Kerr*, 1684.

Distr. Sikkim, Nepal.

Differs from typical *P. glaber* in the nerves on the under surface of the leaf having a few scattered hairs and in the rather denser indumentum of the upper leaf surface and peduncles.

Dysophylla auricularia, *Blume*—F.B.I., iv. p. 638; Williams, Bull. Herb. Boiss., v. (1905) p. 430; Hosseus, l.c. p. 498.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 746; Koh Chang, *Schmidt*, 261.

Distr. S.E. Asia.

Dysophylla Koehneana, *Muschler*, Fedde Rep. Nov. Sp., iv. p. 269; Hosseus, l.c. p. 499.

Pitsanulok, Ban Jang, 120 m., *Hosseus*, 704.

Dysophylla pentagona, *C. B. Clarke ex Hook. f.*, F.B.I., iv. p. 641. *D. linearis*, Hosseus, l.c. p. 499 (at least in part), *non* Benth.

Chiengmai, Doi Sootep, 330 m., *Kerr*, 1465, 700 m., *Hosseus*, 272.

Distr. Chota Nagpur.

Dysophylla sp. affinis *D. peguanae*, Prain et *D. Koehneanae*, Muschler. *D. peguana*, C. B. Clarke apud Ostenfeld, Bull. Herb. Boiss., v. (1905) p. 717; Williams, Bull. Herb. Boiss., v. (1905) p. 961; Hosseus, l.c. p. 499, *vix* Prain.

Raheng, Wang Djao, near Tapotsah, *Lindhard*, 25.

Colebrookia oppositifolia, *Smith*—F.B.I., iv. p. 642; For. Fl. Burma, ii. p. 277; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 114.
Doi Chieng Dao, 1700 m., *Hosseus*, 412.
Distr. India, Burma, Yunnan.

Elsholtzia blanda, *Benth.*—F.B.I., iv. p. 643; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 114. *Teucrium quadrifarium*, Hosseus, l.c. p. 495, *non* Ham.
Chiengmai, Doi Sootep, 1680 m., *Hosseus*, 239.
Distr. E. Himalayas, Burma, Assam, Yunnan, Sumatra.
Dracocephalum longipedicellatum, Muschler, Fedde Rep. Nov. Sp., iv. p. 269; Hosseus, l.c. p. 496 = *Staurogyne obtusa*, O. Kze.

Scutellaria glandulosa, *Hook. f.*—F.B.I., iv. p. 669; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 115.
Chiengmai, Doi Sootep, 300–600 m., *Kerr*, 659.
Distr. Burma.

Anisomeles ovata, *R. Br.*—F.B.I., iv. p. 672; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 115.
Chiengmai, in mixed jungle on Doi Sootep, 660 m., *Kerr*, 1490.
Distr. S.E. Asia.

Colquhounia coccinea, *Wall.*, var. **mollis**, *Prain*, Journ. As. Soc. Beng., lxii. p. 37. *C. vestita*, Hook. f., F.B.I., iv. p. 674 p.p.; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 116, *non* Wall. *Gomphostemma phlomoides*, Hosseus, l.c. p. 496, *non* Benth.
Doi Chieng Dao, 2180 m., *Hosseus*, 399.
Distr. E. Himalayas, Burma, Assam.

Colquhounia elegans, *Wall.*, var. **typica**, *Prain*, Journ. As. Soc. Beng., lxii. p. 37. *C. elegans*, Wall.—F.B.I., iv. p. 674; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 116. *Phlomis albiflora*, Hosseus, l.c. p. 497 *non* Hemsley.
Doi Chieng Dao, 2000 m., *Hosseus*, 410.
Distr. Burma, Manipur.

Colquhounia elegans, *Wall.*, var. **tenuiflora**, *Prain*, Journ. As. Soc. Beng., lxii. p. 38. *C. elegans*, Kurz, For. Fl. Burma, ii. p. 278, *non* Wall. (ex *Prain*, l.c.). *C. tenuiflora*, Hook. f., F.B.I., iv. p. 674. *Stachys siamensis*, Muschler, Fedde Rep. Nov. Sp., iv. p. 270; Hosseus l.c. p. 497.
Chiengmai, Doi Sootep, *Hosseus*, 196; Doi Sootep, 1650 m., *Kerr*, 1680.
Distr. Burma, Yunnan.

Leonurus sibiricus, *Linn.*—F.B.I., iv. p. 678.
Chiengmai, 300 m., *Kerr*, 1662—"a garden weed."
Distr. Trop. Asia, America.

Leucas aspera, *Spreng.*—F.B.I., iv. p. 690; Williams, Bull. Herb. Boiss., v. (1905) p. 961. *L. stelligera*, Williams, l.c. p. 430; Hosseus, l.c. p. 497, *non* Benth.
Wang Djao, river banks, *Hosseus*, 29, *Lindhard*, 76; Bangkok, *Zimmermann*, 168.
Distr. India, Malay Archipelago, Mauritius.

Leucas lanata, *Benth.*—F.B.I., iv. p. 681 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 116.
Doi Chieng Dao, 2200 m., *Hosseus*, 402.
Distr. India, Burma, S. China.

Leucas linifolia, *Spreng.*—F.B.I., iv. p. 690.
Banks of Meh Ping, opposite Ban Salu, 350 m., *Hosseus*, 379.
Distr. India, China, Malaya, Mauritius.

Leucas mollissima, *Wall.*—F.B.I., iv. p. 682. *Marrubium lamioides*, Muschler, Fedde Rep. Nov. Sp., iv. p. 271 ; Hosseus, l.c. p. 496.
Chiengmai, Doi Sootep, *Hosseus*, 206, 300 m., *Kerr*, 1331.
Distr. India, Assam, China, Tonkin.
Neither of these two plants is quite typical *L. mollissima*, that of Hosseus differing slightly in the calyx teeth while Kerr's plant has the inflorescence very much reduced.

Leonotis nepetaefolia, *Br.*—F.B.I., iv. p. 691.
Above Meh Ping Rapids, Ban Meh Kah, 195 m., *Kerr*, 911.
Distr. Trop. Asia, Africa, America.
***Gomphostemma intermedium**, *Craib*, Kew Bull., 1910 p. 23.
Chiengmai, Doi Sootep, 720 m., *Kerr*, 733.

Gomphostemma strobilinum, *Wall.*, var. **viridis**, *Hook. f.*, F.B.I., iv. p. 696 ; Prain, Ann. Roy. Bot. Gard. Calc., iii. 2, p. 247. *G. javanicum*, Hosseus, l.c. p. 496, *non* Benth.
Wang Djao, *Hosseus*, 62 (flowerless specimen).
Distr. Lower Burma.

Gomphostemma Wallichii, *Prain*, Ann. Roy. Bot. Gard. Calc., iii. 2, p. 245. *G. strobilinum*, Hook. f., F.B.I., iv. p. 696 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 116, *non* Wall. *G. dentatum*, Muschler, Fedde Rep. Nov. Sp., iv. p. 270 ; Hosseus, l.c. p. 496.
Chiengmai, Doi Sootep, 800–1500 m., *Kerr*, 1380, *Hosseus*, 280.
Distr. Yunnan (ex *Prain*, l.c.), Burma, Assam.

Teucrium quadrifarium, *Ham.* sensu lato—F.B.I., iv. p. 701. *T. tomentosum*, Hosseus, l.c. p. 496 *non* Heyne.
Chiengmai, in open grassy jungle on Doi Sootep, 1350–1500 m., *Kerr*, 1500 ; Doi Chieng Dao, on limestone, 2100 m., *Hosseus*, 418.
Distr. Himalayas, China, Burma, Khasia.
Hosseus, 418 in its minute bracts approaches *T. Wattii*, Prain but the leaves are those of *T. quadrifarium*. In no case, however, can it be referred to the S. Indian *T. tomentosum*. *Kerr*, 1500 is probably a tall form of *T. fulvum*, Hance.

INCOMPLETAE.

Nyctagineae.

Boerhaavia repanda, *Willd.*—F.B.I., iv. p. 709.
Meh Ping, Ban Na, *Kerr*, 2028.
Distr. India, Burma.

Amarantaceae.

Psilotrichum trichotomum, *Blume*—F.B.I., iv. p. 725.
Chiengmai, Doi Sootep, in deciduous jungle, 600 m., *Kerr*, 1427.
Distr. Burma, Assam, Malaya.

Aerua Monsonia, *Mart.*—F.B.I., iv. p. 728.
Cape Liant, *Murton*, 29.
Distr. India, Burma.

Achyranthes bidentata, *Blume*—F.B.I., iv. p. 730.
Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1322.
Distr. India, Khasia, China, Japan, Java, Trop. Africa.

Alternanthera sessilis, *R. Br.*—F.B.I., iv. p. 731.
Chiengmai, 300 m., *Kerr*, 854.
Distr. Tropics and subtropics.

Polygonaceae.

Polygonum barbatum, *Linn.*—F.B.I., v. p. 37 ; Gage, Rec. Bot. Surv. Ind., ii. p. 397 ; Williams, Bull. Herb. Boiss., iv. (1904) p. 1030.

Chiengmai, bank of Meh Ping, 300 m., *Kerr*, 851 ; Bangkok, *Schomburgk*, 225.

Distr. Tropical and subtropical Asia, Africa, Australia.

Polygonum chinense, *Linn.* vars.

Chiengmai, Doi Sootep, 1500–1650 m., *Kerr*, 1104, *Hosseus*, 193 ; Doi Intanon, 2300–2570 m., *Hosseus*, 345, 355.

Of the above *Hosseus*, 345 is probably *P. chinense* and the remaining plants might be referred to the variety *ovalifolium* (Miq.).

Polygonum flaccidum, *Meissn.*—F.B.I., v. p. 39 ; Gage, Rec. Bot. Surv. Ind., ii. p. 402.

Chiengmai, bank of Meh Ping, 300 m., *Kerr*, 853.

Distr. S.E. Asia.

Polygonum glabrum, *Willd.*—F.B.I., v. p. 34 ; Gage, Rec. Bot. Surv. Ind., ii. p. 393.

Wang Djao, *Hosseus*, 31a, 31b, pro parte.

Distr. Tropical and subtropical Asia, Africa, America.

Polygonum stagninum, *Ham.*—F.B.I., v. p. 37 ; Gage, Rec. Bot. Surv. Ind., ii. p. 397.

Banks of Menam, *Hosseus*, 2 ; Wang Djao, *Hosseus*, 31b (Herb. Kew, pro parte ! et Copenhagen !).

Distr. India, Burma.

Muhlenbeckia platyclados, *Meissn.*

Chiengmai, Doi Sootep, 1700 m., *Hosseus*, 215 (Herb. Kew ! et Copenhagen !).

Native of Solomon Is.

Rafflesiaceae.

Richtofenia siamensis, *Hosseus*, Engl. Bot Jahrb., xli. p. 55, cum tab.

Chiengmai, Doi Sootep.

According to *Kerr* the host plant is *Tetrastigma cruciatum*.

Aristolochiaceae.

Aristolochia Hookeriana, *Craib*, sp. n., *A. Tagalae*, Cham., affinis sed bracteis conspicuis, floribus seminumque alis minoribus differt.

Caules scandentes, glabri, sulcati. *Folia* lanceolata vel late lanceolata, apice acuta, basi cordata vel interdum sagittata, 5–15·5 cm. longa, 1·5–4·8 cm. lata, tenuiter chartacea, supra marginem versus densius breviter hirsuta, subtus subglabra, e basi 5-nervata nervis secondariis (e costa ortis) utrinque 2–4 intra marginem arcuatis omnibus supra conspicuis subtus cum nervis transversis prominentibus; petioli 0·7–2 cm. longi. *Cymae* axillares, plerumque simplices, petiolos paulo superantes, pedunculo communi brevi; bracteae lanceolatae vel anguste lanceolatae, acutae, ad 1 cm. longae, 2 mm. latae; pedicelli 5–7 mm. longi, pilosi. *Receptaculum* subtubulosum, 5 mm. altum, 1 mm. diametro, pilosum. *Calycis* atro-purpurei (ex *Kerr*) pars ima basi tubulosa, 3 mm. longa, 0·5 mm. diametro, utriculus subglobosus, 3 mm. diametro, tubus superne dilatatus, circiter 8 mm. longus, 1 mm. diametro, limbus oblongus, breviter apiculatus, ad 1·6 cm. longus, extra, nervis praecipue, pilosus. *Fructus* pedicello ad 3·5 cm. longo suffultus, 6-costatus, 2–3 cm. longus, vix 2 cm. diametro; semina triangularia, tenuia, alis 1 mm. tantum latis.—*A. Roxburghiana*, Hook. f., F.B.I., v. p. 75, p.p.; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 118, *vix* Klotsch.

Chiengmai, in eng jungle on Doi Sootep, 390 m., *Kerr*, 838; in mixed jungle on Doi Sootep, 420 m., *Kerr*, 1454.

Distr. Upper Burma, *Collett*, 23; Rangoon, *Mc Clelland*.

To this species probably also belong *Lace* 3286 and 4328 from Maymyo Plateau although the larger, broader leaves remind one rather of *A. Tagala*, Cham.

Aristolochia Kerrii, *Craib*, sp. n., a speciebus indicis et indochinensibus habitu erecto recedit.

Caules e rhizomate oriundi annui, 30–45 cm. alti, puberuli, valde sulcati. *Folia* ovato-lanceolata, apice acuta, basi cordata, 3·5–8·5 cm. longa, 1·5–5·5 cm. lata, chartacea, supra juventute minute puberula, matura glabra, subtus nervis nervulisque minute densius puberula, e basi 5-nervata, nervis supra conspicuis subtus cum nervis transversis prominentibus; petioli 0·5–1·7 cm. longi, ut in caule puberuli. *Cymae* axillares, pauciflorae, breves, pedunculo perbrevi suffultae; bracteae conspicuae, lanceolatae, acutae, 6 mm. longae, 2 mm. latae; pedicelli ad 7 mm. longi, fere glabri. *Receptaculum* subtubulosum, circiter 3 mm. longum, 0·5 mm. diametro, sulcatum, glabrum. *Calycis* extra glabri utriculus subglobosus, 3 mm. diametro, tubus ad 7 mm. longus, superne parum dilatatus, limbus 8 mm. longus.

Chiengmai, in deciduous jungle on Doi Sootep, 600 m., *Kerr*, 627.

Piperaceae.

Piper boehmeriaefolium, *Wall.*—F.B.I., v. p. 85.

Chiengmai, in marshy evergreen jungle on Doi Sootep, 900 m., *Kerr*, 1260; Doi Intanon, 1600 m., *Hosseus*, 341 (Herb. Kew! et Copenhagen!).

Distr. E. Himalayas, Assam, Burma.

Of the specimens of this species collected by Dr. Kerr half of them agree with typical *P. boehmeriaefolium* in their glabrous leaves

and branchlets but the remainder differ in that the under surface of the leaves and the young branchlets are not glabrous.

Piper sp.
Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1169.
Represented by male plants with only young inflorescences.

Peperomia pellucida, *Kunth.*
Chiengmai, 300 m., *Kerr*, 1442.
An introduced garden weed.

Peperomia reflexa, *A. Dietr.*—F.B.I., v. p. 99.
Chiengmai, on tree trunks in evergreen jungle on Doi Sootep, 1500 m., *Kerr*, 1375.
Distr. Tropics and subtropics.

Chloranthaceae.

Chloranthus kachinensis, *King et Prain*, Journ. As. Soc. Beng., lxix. p. 173.
Chiengmai, Doi Sootep, in open grassy jungle, 1380 m., *Kerr*, 1190.
Distr. Kachin Hills.

Lauraceae.

Beilschmiedia sp. n. ?
Phre Me Sang, 210 m., *Luang Vanpruk*, 214.

Cinnamomum iners, *Reinw.*—F.B.I., v. p. 130 ; ? For. Fl. Burma, ii. p. 287.
Meh Ping, Chieng Dao, in evergreen jungle, 420 m., *Kerr*, 1055.
Distr. Burma, Malaya.

Machilus Kurzii, *King ex Hook. f.*, F.B.I., v. p. 860 ?
Chiengmai, Doi Sootep, 1700 m., *Hosseus*, 184 (Herb. Kew ! et Copenhagen !).
Distr. Sikkim, Burma.

Actinodaphne angustifolia, *Nees* ?—F.B.I., v. p. 152.
Chiengmai, in evergreen jungle on Doi Sootep, 1140 m., *Kerr*, 1643 (♂ only).
Distr. Bengal, Burma, Assam, Malay Archipelago.

Litsaea polyantha, *Juss.*—F.B.I., v. p. 162. *Tetranthera monopetala*, Roxb.—For. Fl. Burma, ii. p. 299.
Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1137 ; Phre, 120–180 m., *Luang Vanpruk*, 153.
Distr. Himalayas, Bengal, Assam, Burma, Hongkong, Hainan, Malay Peninsula.

Litsaea salicifolia, *Roxb.*—F.B.I., v. p. 167. *Tetranthera glauca*, Wall.—For. Fl. Burma, ii. p. 300.
Chiengmai, in evergreen jungle on Doi Sootep, 1500 m., *Kerr*, 1111.
Distr. N. India, Burma, Assam.

Litsaea sebifera, *Pers.*—F.B.I., v. p. 157.
Chiengmai, in mixed jungle at foot of Doi Sootep, 330 m., *Kerr*, 1208 ; ? Meh Ping, Muang Hawt, 240 m., *Kerr*, 2018.
Distr. S.E. Asia.

Litsaea semecarpifolia, *Wall.*—F.B.I., v. p. 165. *Tetranthera semecarpifolia*, Wall.—For Fl. Burma, ii. p. 303.

Chiengmai, in mixed jungle on Doi Sootep, 660 m., *Kerr*, 1760.

Distr. Bengal, Burma, Manipur.

Litsaea (?) sp.

Chiengmai, in evergreen jungle on Doi Sootep, 1200–1500 m., *Kerr*, 880 (♀ only).

Lindera caudata, *Benth.*—F.B.I., v. p. 184. *Daphnidium caudatum*, Nees—For. Fl. Burma, ii. p. 307.

Chiengmai, Doi Sootep, in evergreen jungle, 1260 m., *Kerr*, 1390.

Distr. Khasia and Naga Hills, Upper Burma.

Lindera pulcherrima, *Benth.*—F.B.I., v. p. 185 ; For. Fl. Burma, ii. p. 306.

Doi Intanon, 2570 m., *Hosseus*, 358 (Herb. Kew! et Copenhagen !).

Distr. Himalayas, Khasia.

Proteaceae.

Helicia erratica, *Hook. f.*, F.B.I., v. p. 189 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 119.

Chiengmai, in open jungle on slopes of ridges on Doi Sootep, 900–1500 m., *Kerr*, 622.

Distr. Sikkim, Assam, Burma (? Borneo).

Thymelaeaceae.

Linostoma persimile, *Craib*, sp. n., *L. pauciflora*, Griff., facie similis sed floribus brevioribus, staminibus inclusis, perianthio fructifero basi rotundato eiusque lobis dimidio brevioribus distinguenda.

Suffrutex erectus—vel interdum scandens—circiter 2 m. altus (ex *Kerr*), glaber. *Ramuli* teretes, virgati, cortice rubro-brunneo obtecti. *Folia* opposita vel subopposita, elliptica vel obovata, apice apiculata, basi cuneata, circiter 3 cm. longa, 1·5 cm. lata, margine integra, incrassata, chartacea, supra fusco-viridia, subtus pallidiora, nervis lateralibus utrinque numerosis parallelis cum costa supra subconspicuis subtus prominulis ; petioli 2 mm. longi, basi leviter incrassati. *Pedunculi* graciles, fere 3 cm. longi, 3-flori, bracteis tribus sessilibus ornati quarum una basin prope usque ad 1 cm. longa 5 mm. lata, ceterae medium prope flores obtegentes usque ad 2·5 cm. longae 2 cm. latae, foliis similibus nisi pallidioribus tenuioribus majoribusque basi cordatis apice acutis ; bracteolae parvae, filiformes vel auguste lanceolatae. *Alabastra* clavata. *Perianthii* tubus cylindraceus, 9 mm. longus, 2 mm. diametro, lobi 5, fere 5 mm. longi, squamae 10, lineares, lobis breviores. *Stamina* 10, inclusa. *Ovarium* densissime pilosum, 3 mm. altum.

Chiengmai, in open pine jungle on Doi Sootep, 915 m., *Kerr*, 814.

Loranthaceae.

Loranthus cultarum, *Craib*, sp. n., *L. pulverulento*, Wall., similis sed inflorescentiae indumento stellato, corolla multo breviore differt.

Ramuli teretes, lenticellati, cortice cinereo vel rubro-brunneo. *Folia* subelliptica vel ovato-lanceolata, apice obtusa, basi interdum

inaequalia, rotundata, 4–9·4 cm. longa, 2–5·2 cm. lata, subcoriacea, matura glabra vel subtus pilis stellatis perpaucis instructa, juventute utrinque stellato-tomentella, supra ferruginea, subtus pallida, nervis lateralibus utrinque 6–7 intra marginem arcuatis pagina utraque prominulis nervis transversis uti reticulatione laxa prominulis; petioli 1 cm. longitudinis vix attingentes, glabrescentes. *Inflorescentia* axillaris, petiolis duplo vel triplo longior; bracteae parvae; pedicelli circiter 4 mm. longi, stellato-tomentelli. *Receptaculum* anguste turbinatum, 4 mm. altum, 1·5 mm. diametro, densius stellato-tomentellum. *Calyx* fere obsoletus. *Corollae* extra stellato-tomentellae intra glabrae tubus 1·6 cm. longus, inferne parum dilatatus, unilateraliter fere ad basin fissus, lobi 4, reflexi, linearis-spathulati, acuti, 7 mm. longi. *Filamenta* 2·5 mm. longa, glabra, paulo supra corollae loborum basin inserta, antheris circiter 2 mm. altis. *Stylus* stamina paulo superans, stigmate parvo capitato.

Chiengmai, 300 m., *Kerr*, 820—parasitic on cultivated trees, *Nerium Oleander* and *Pomegranate* (ex *Kerr*).

Loranthus Kerrii, *Craib*, sp. n., a *L. pentandro*, Linn., corolla multo majore recedit.

Ramuli teretes, lenticellati, cortice cinereo vel brunneo subnitido obtecti. *Folia* opposita, subopposita vel alterna, oblique lanceolata, late lanceolata vel ovata, apice obtusa, basi attenuata vel obtusa, 6–18 cm. longa, 3–12 cm. lata, rigide coriacea, utrinque glabra, nervis lateralibus utrinque 2–4 obliquis pagina utraque conspicuis, nervis transversis subconspicuis; petioli 0·7–1 cm. longi, maturi crassi. *Inflorescentia* axillaris, petiolis duplo saltem longior; bracteae solitariae, vix 3 mm. longae; pedicelli circiter 4 mm. longi. *Receptaculum* cylindraceum, 3 mm. altum, 2·5 mm. diametro, tomentellum. *Calyx* conspicuus, margine subtruncatus vel irregulariter lobatus, 1·5 mm. altus, glabrescens. *Corolla* aurantiaca (ex *Kerr*) extra tomentella intra loborum summo apice tubique ima basi glabris exceptis parce stellato-pubescens; tubus 1·6 cm. longus, 4–5 mm. diametro; lobi medio reflexi, 2 cm. saltem longi, angusti, apice acuti. *Filamenta* 7 mm. longa, glabra, loborum circiter medium affixa, antheris 5 mm. longis. *Stylus* stamina paulo superans, glaber, stigmate parvo capitato.

Chiengmai, Doi Sootep, 300 m., *Kerr*, 949—on *Pentacme siamensis*.

Loranthus Parishii, *Hook. f.*, F.B.I., v. p. 205.

Chiengmai, Doi Sootep, 750 m., *Kerr*, 1763.

Distr. Tenasserim.

Loranthus pentandrus, *Linn.*—F.B.I., v. p. 216; For. Fl. Burma, ii. p. 320; Williams, Bull. Herb. Boiss., iv. (1904) p. 1028.

Chiengmai, 300 m., *Kerr*, 819; Doi Sootep, 900–1050 m., *Hosseus*, 499 (Herb. Kew! et Copenhagen!), 262; Bangkok, *Schomburgk*, 222, 313.

Distr. Indo-China, Malaya.

The writer has seen no specimen of *L. Zimmermannii*, Warb., Pl. nov. Herb. Hort. Then., t. 82 but the plate and description point to its being very closely allied to *L. pentandrus*.

Loranthus pentapetalus, *Roxb.*—F.B.I., v. p. 206; For. Fl. Burma, ii. p. 322; Williams, Bull. Herb. Boiss., iv. (1904) p. 1028.

Chiengmai, Doi Sootep, 1350 m., *Kerr*, 619; Chantaboon, *Murton*, 65.

Distr. Sikkim, Assam, Burma, Yunnan, Hainan, Malaya.

Loranthus scurrula, *Linn.*—F.B.I., v. p. 208; For. Fl. Burma, ii. p. 319.

Chiengmai, in open jungle on Doi Sootep, 1590 m., *Kerr*, 1377.

Distr. India, Assam, Burma.

Loranthus siamensis, *Kurz*—F.B.I., v. p. 223; For. Fl. Burma, ii. p. 320; Williams, Bull. Herb. Boiss., iv. (1904) p. 1028.

Kanburi, *Teysmann*.

2918 **Loranthus sootepensis**, *Craib*, sp. n., a speciebus indicis ob indumentum, inflorescentiae praeclare, e pilis longiusculis verticillatim ramosis densissimis constitutum distincta.

Ramuli juventute pilis verticillatim ramosis dense albido-tomentosi, mox glabri, cortice brunnescente lenticellato obtecti. *Folia* ovata vel ovato-lanceolata, apice obtusa, basi rotundata, 5·5–10 cm. longa, 2·5–6 cm. lata, rigide chartacea, supra juventute pilis stellatis et verticillatim ramosis instructa, matura glabra, subtus costa nervisque indumento plus minusve persistente ut in ramulis novellis cetera pilis stellatis et praeterea pilis paucis verticillatim ramosis instructa, nervis lateralibus utrinque 5–7 pagina utraque sicco prominulis; petioli circiter 1 cm. longi, ut in ramulis juvenilibus tomentosi. *Inflorescentia* axillaris, congesta, petiolos paulo superans, pilis verticillatim ramosis dense albido- vel subferrugineo-tomentosa; pedicelli 3 mm. longi, fere 2 mm. diametro; bracteae solitariae, 2·5 mm. longae. *Receptaculum* 7 mm. altum, 3 mm. diametro. *Calyx* obsoletus. *Corollae* intra glabrae tubus 8 mm. longus, unilateraliter infra medium fissus, lobi 4, suberecti, apice incurvi, subcucullati, acuti, 5 mm. longi. *Stamina* inclusa, paulo supra loborum bases inserta, filamentis 2 mm. longis glabris, antheris 1 mm. longis.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 947.

Loranthus securidacoides, Warb. Pl. Nov. Herb. Hort. Then. t. 81 —*vide* sub *Olax scandens*.

Elytranthe affinis, *Craib*, sp. n., ab *E. evenia*, Engler, calyce majore, corollae lobis reflexis, ab *E. hypoglauca*, Craib, foliorum nervis pagina utraque magis prominulis, receptaculo multo breviore recedit.

Folia lanceolata vel ovato-lanceolata, apice obtusa, basi in petiolum brevem attenuata, 3·3–10 cm. longa, 1·3–4·2 cm. lata, coriacea, utrinque glabra, supra pallide viridia, subtus subglauca, nervis lateralibus utrinque circiter 7 intra marginem arcuatis pagina utraque, superiore magis, prominulis. *Pedunculi* perbreves, axillares, solitarii vel gemini, 2-flori; pedicelli vix 3 mm. longi, ut in pedunculis glabri; bracteae cum bracteolis duobus parvae, persistentes. *Receptaculum* tubulosum, 1·5 mm. longum, vix 1 mm. diametro, glabrum. *Calyx* conspicuus, subtruncatus vel irregulariter lobatus, 0·5 mm. altus, glaber. *Corollae* rubrae (ex *Kerr*) tubus 2·1 cm. longus, superne sensim dilatatus, apice 3 mm. diametro, lobi 6, subaequales, medio reflexi, lineari-spathulati, acuti, parte reflexa 7 mm. longa. *Stamina* exserta, filamentis glabris 4·5 mm.

longis. *Stylus* glaber, stamina paulo superans, stigmate parvo capitato. *Fructus* aurantiacus (ex *Kerr*), globosus, circiter 1 cm. diametro, calycem stylique partem basalem persistentes gerens.

Chiengmai, Doi Sootep, in evergreen jungle, 1140 m., *Kerr*, 1318.

Elytranthe ampullacea, *Engler*. *Loranthus ampullaceus*, Roxb.—F.B.I., v. p. 220 ; For. Fl. Burma, ii. p. 316.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1712.

Distr. Indo-China, Malay Peninsula.

Viscum articulatum, *Wall.*—F.B.I., v. p. 226 ; For. Fl. Burma, ii. p. 325 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 121.

Chiengmai, Doi Sootep, 420m., *Kerr*, 1301—parasitic on *Loranthus*.

Distr. S.E. Asia.

Kerr's plant is probably the form *fragile* (Wall. pro sp.).

Viscum sp. near *V. orientale*, Willd.

Chiengmai, 300 m., *Kerr*, 818.

Included in *V. orientale* only in sensu lato, for under that species there are included several well marked forms.

Ginalloa siamica, *Craib*, sp. n., a *G. Helferi*, Kurz, foliorum forma, spicis longioribus crassioribus recedit.

Ramuli validi, basi incrassato-vaginati, glabri, cortice plerumque viridescente irregulariter fisso obtecti. *Folia* elliptica, oblongo-elliptica vel oblongo-obovata, apice rotundata, basi cuneata vel late cuneata, 2·5–6 cm. longa, 1·35 cm. lata, coriacea, glabra, e basi 5-nervia, nervis utrinque conspicuis, petiolo brevi suffulta. *Spicae* ad 8·5 cm. longae, rachi vix 2 mm. diametro.

Chiengmai, Doi Sootep, 420 m., *Kerr*, 1300—on *Pentacme siamensis*.

Santalaceae.

Henslowia sessilis, *Craib*, sp. n., ab *H. heterantha*, Hook. f. et Thoms. et *H. frutescente*, Benth., fructu sessili recedit.

Ramuli glabri, cortice brunneo obtecti, ad 2·5 mm. diametro ; ramorum cortex cinereo-brunneus, irregulariter longitudinaliter fissus. *Folia* ovato-lanceolata, apice obtusa, basi in petiolum brevem attenuata, 2·5–7·5 cm. longa, 1·3–3·3 cm. lata, coriacea, utrinque glabra, e basi trinervata, pedatim 5-nervata, nervis utrinque conspicuis, nervis transversis plerumque subconspicuis. *Flores* δ $+$ axillares, fasciculati, petiolis subaequales. *Fructus* vix maturus, basi bracteolis parvis ciliatis instructus.

Chiengmai, Doi Sootep, 1050 m., *Kerr*, 1768.

Scleropyron Wallichianum, *Arnott*—F.B.I., v. p. 234 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 122.

Doi Saket, Ban Sun Pah Suk, in deciduous jungle, *Kerr*, 1026 ; Chiengmai, Doi Sootep, 330–660 m., *Kerr*, 1701, 1711.

Distr. S. India, Ceylon, Burma.

Lao name, Mă Krău Nam.

Euphorbiaceae.

Euphorbia Kerrii, *Craib*, sp. n., ab *E. sessiliflora*, Roxb., ovario longe stipitato recedit.

Rhizoma perenne, carnosum, ad 9 cm. longum, 4 cm. diametro. *Caules* solitarii vel raro 3, 16–25 cm. alti, 5 mm. diametro,

altius sulcati, glabri. *Folia* reducta, anguste elliptica, acuta, dorso carinata, 3 mm. longa, vix 2 mm. lata, glabra, petiolo brevi tereti suffulta; stipulae minutae. *Cymae* sessiles; bracteae ovato-lanceolatae, acuminatae, 5 mm. longae, 2·5 mm. latae, involucrum duplo excedentes, dorso medio carinatae, glabrae. *Involucrum* circiter 5 mm. diametro, glabrum, e glandulis 5 et lobis 5 elliptico-obovatis fimbriatis; glandulae contiguae, transverse oblongae, 1 mm. longae, 2 mm. latae, integrae. *Ovarium* glabrum, acute triangulare, pedicello circiter 8 mm. longo glabro exsertum, recurvum. *Stylus* 0·5 mm. longus; rami ad 1·5 mm. longi, glabri. *Capsula* 6 mm. alta, circiter 8 mm. diametro, glabra; semina subglobosa, ad 3 mm. diametro, albida, minutius arcte pustulata.

Near Lakon, in deciduous bamboo jungle, 300 m., *Kerr*, 974.

Lao name, Chĭdĭ Dooan.

According to Dr. Kerr the root is used by the natives for poisoning fish.

Euphorbia Lacei, *Craib*, sp. n., ab *E. antiquorum*, Linn., spinis brevioribus, involucris subsessilibus vel breviter pedunculatis recedit.

Arbor ad 3·5 m. alta (ex *Kerr*); ramuli floriferi 17–25 cm. longi, sicco ad 2·5 cm. diametro, succulenti, glabri; anguli 3, alaeformes, distanter dentati, dentibns ad 5 cm. distantibus; spinae geminae, parvae, divaricatae, fusco-brunneae. *Bracteae* late ellipticae, 3·5 mm. longae, 3·5 mm. latae. *Involucra* solitaria, subsessilia vel breviter pedunculata, vix 1 cm. diametro, glabra, e glandulis 5 et lobis 5 fimbriatis circiter 2 mm. longis et latis glabris constituta; glandulae transverse oblongae, 4·25 mm. latae, 2 mm. longae, glabrae.

Lakon, Hooey Meh Tan, 600 m., *Kerr*, 1018.

Distr. Burma, Hantawaddy, Yoma Reserve, *Lace*, 2920.

The lateral involucres of the cyme which are not developed in any of the above specimens will probably bear the female as no trace of an ovary is found in the developed terminal involucres.

Euphorbia serrulata, *Reinw.*

Chiengmai, among grass in open jungle on Doi Kum, 420 m., *Kerr*, 1656.

Distr. Formosa, Macao, Philippines, Tonkin, Malay Archipelago.

Euphorbia thymifolia, *Burm.*—F.B.I., v. p 252.

Chiengmai, 300 m., *Kerr*, 1475—"a garden weed."

Distr. S.E. Asia.

Euphorbia congenera, Williams, Bull. Herb. Boiss., v. (1905) p. 32, an Bl.?

The specimens quoted by Williams l.c. under this species agree rather with the description of *E. reniformis*, Bl., but in the absence of authentic material the writer cannot refer them definitely to either species.

Bridelia affinis, *Craib*, sp. n., *B. pubescenti*, Kurz, habitu similis sed inflorescentia fere glabra facile distinguenda.

Arbuscula ad 6 m. alta (ex *Kerr*); ramuli primo parce ferrugineo-pilosi, mox glabri, cortice rubro-brunneo parce lenticellato obtecti. *Folia* obovato-elliptica vel oblanceolata, apice rotundata vel plerumque breviter obtuse acuminata, basi obtusa, 5–15 cm. longa, 2–6 cm. lata, chartacea, supra costa nervisque praecipue pilosula, subtus parce molliter pilosa, nervis lateralibus utrinque

10–14 ad marginem excurrentibus supra conspicuis subtus cum nervis transversis prominentibus; petioli ad 7 mm. longi, teretes, breviter pilosi; stipulae deciduae, circiter 5 mm. longae, 1 mm. latae. *Inflorescentia* axillaris, sessilis. *Floris* ♀ calycis segmenta triangularia, acuta, 1·5 mm. longa, 1·5 mm. lata, quam petalis circiter duplo longiora. *Ovarium* glabrum, 0·75 mm. altum; styli duo, 1 mm. longi. *Floris* ♂ calyx calyci ♀ similis. *Stamina* 5. *Ovarii* rudimentum parvum.

Chiengmai, in evergreen jungle on Doi Sootep, 600 m., *Kerr*, 809.

Bridelia retusa, *Spr.*—F.B.I., v. p. 268; For. Fl. Burma, ii. p. 368.

Chiengmai, in eng jungle on Doi Sootep, 330 m., *Kerr*, 798.

Distr. India, Burma.

Bridelia stipularis, *Blume*—F.B.I., v. p. 270, p. p.; For. Fl. Burma, ii. p. 369; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 122.

Chiengmai, Doi Sootep, 330 m., *Kerr*, 1460; Phre, 156–240 m., *Luang Vanpruk*, 128.

Distr. S.E. Asia, (Trop. Africa ?).

Bridelia tomentosa, *Blume*—F.B.I., v. p. 271; For. Fl. Burma, ii. p. 367.

Chiengmai, in open jungle near a village, *Kerr*, 915.

Distr. N. India to China and southwards to Australia.

Sauropus albicans, *Blume*—F.B.I., v. p. 332; For. Fl. Burma, ii. p. 349.

Chiengmai, 300 m., on waste ground, *Kerr*, 760.

Distr. S.E. Asia.

Sauropus brevipes, *Muell.-Arg.*—F.B.I., v. p. 335.

Chiengmai, Doi Sootep, in deciduous jungle, 330 m., *Kerr*, 1339.

Distr. Burma.

Sauropus (Ceratogynum) rigidus, *Craib*, sp. n., a *S. concinno*, Coll. et Hemsl., floribus ♂ fere duplo majoribus eorum sepalis latioribus apice retusis vix emarginatis foliorumque forma recedit.

Suffrutex ad 6 dm. altus (ex *Kerr*), omnino glaber; rami ad 3 mm. diametro, cortice striato. *Folia* subelliptica, ovato-lanceolata vel lanceolata, mucronata, basi interdum inaequalia, obtusa vel subrotundata, 1·2–4·1 cm. longa, 0·7–1·7 cm. lata, rigida, nervis lateralibus utrinque 4–5 pagina utraque conspicuis, margine recurvo; petioli 2–3 mm. longi; stipulae parvae, rigidae. *Flores* ♂ in racemos breves axillares conspicue bracteatos dispositi, pedicellis fere 5 mm. longis suffulti. *Sepala* 6, apice retusa, 2 mm. longa, vix 2 mm. lata. *Discus staminaque* generis. *Flores* ♀ solitarii, pedicellis 3 mm. longis suffulti. *Sepala* 6, subrotundata, breviter acuminata, exteriora 3 mm. longa, 3·5 mm. lata, quam interioribus paulo majora. *Ovarium* 1·5 mm. altum; styli 3, subpatuli, bifidi.

Chiengmai, in deciduous jungle on Doi Sootep, 300–1560 m., *Kerr*, 651, 1825.

Sauropus similis, *Craib*, sp. n., a *S. brevipede*, Muell.-Arg., foliorum forma, a *S. quadrangulari*, Muell.-Arg., ramulis foliisque vix glabris, florium ♂ perianthii segmentis latioribus recedit.

Suffrutex sarmentosus, vix 1 m. altus (ex *Kerr*); rami quadrangulares, virides, cito glabri; ramuli quadrangulares, angulis

setulis rigidis instructi. *Folia* ovato-lanceolata vel lanceolata, apice acutiuscula, mucronata, basi late cuneata vel subrotundata, 1–3 cm. longa, 0·7–1·4 cm. lata, chartacea, supra costa marginesque versus setulosa, subtus costa nervisque setulosa, nervis lateralibus utrinque 4–5 intra marginem arcuatis supra plerumque conspicuis subtus prominentibus, breviter petiolata ; stipulae anguste deltoideae, acutae, ad 1 mm. longae, dorso carinatae. *Flos* ♂ circiter 2 mm. diametro. *Discus staminaque* generis. *Flos* ♀ 4·5 mm. diametro. *Sepala* 6, subrhomboidea, apice rotundata, apiculata, 2·25 mm. lata. *Styli* 0·5 mm. longi.

Chiengmai, in evergreen jungle on Doi Sootep, 720 m., *Kerr*, 1788 ; Wang Djao, *Hosseus*, 48.

Glochidion assamicum, *Hook. f.*, F.B.I., v. p. 319.

Meh Ping, Chieng Dao, 420 m., *Kerr*, 1056.

Distr. India, Burma, Assam.

Glochidion coccineum, *Muell.-Arg.*—F.B.I., v. p. 308 ; For. Fl. Burma, ii. p. 342.

Chiengmai, Doi Sootep, in deciduous jungle, 300–450 m., *Kerr*, 739.

Distr. Burma.

Glochidion Daltoni, *Kurz*, For. Fl. Burma, ii. p. 344 ; F.B.I., v. p. 320.

Lakon, Hooey Meh Tan, 420 m., *Kerr*, 1016 ; Chiengmai, Doi Sootep, 660–1000 m., *Kerr*, (? 1281), 1723, *Hosseus*, 431.

Distr. Sikkim, Yunnan, Burma.

Lao name, M'Kai (ex *Kerr*).

Glochidion Kerrii, *Craib*, sp. n., ab affini *G. villicauli*, Hook. f., stylo longiore tenuiore altius bifido recedit.

Arbuscula circiter 6 m. alta (ex *Kerr*) ; ramuli juventute densius albido vel ferrugineo-hirsuti, mox glabri ; rami cortice cinereo vel rubro-cinereo lenticellato obtecti. *Folia* lanceolata vel ovato-lanceolata, apice acuta, basi parum inaequalia, obtusa vel rotundata, 1–6·5 cm. longa, 0·8–2·8 cm. lata, rigide chartacea, supra costa parce hirsuta, cetera subglabra, subtus, costa nervisque praecipue, pilosa, nervis lateralibus utrinque 4–5 supra conspicuis vel maturis leviter impressis subtus prominentibus nervis transversis paucis subtus subprominulis ; petioli breves, indumento ut in ramulis. *Flores* ♂ pedicellis 8 mm. longis pilis paucis patulis instructis suffulti. *Sepala* 3 exteriora elliptica, apice obtusa, 1·75 mm. longa, 1 mm. lata, indumento dorso ut in pedicellis, interiora late oblanceolata, 1·75 mm. longa, 0·75 mm. lata, fere glabra. *Stamina* 3, connata, columna brevissima, connectivis productis. *Flores* ♀ subsessiles. *Stylus* ad 2·5 mm. longus, apice trilobatus, lobis vix 1 mm. longis, pilis longiusculis patulis albidis densius instructus.

Chiengmai, Doi Sootep, 720 m., *Kerr*, 1070.

Since the above description was drawn up there has been received a further collection of evidently the same species from evergreen jungle at 1260 m. elevation on Doi Sootep (*Kerr*, 1514).

Glochidion velutinum, *Wight*—F.B.I., v. p. 322 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 124. *Phyllanthus nepalensis*, Muell.-Arg.—For. Fl. Burma, ii. p. 344.

Chiengmai, Doi Sootep, 1650 m., *Kerr*, 675, 1321, *Hosseus*, 501 (Herb. Kew ! et Copenhagen !).

Distr. India, Burma, Assam.

Glochidion sp.
Ban Djam, 300 m., *Hosseus*, 452 (♂ only).

Phyllanthus columnaris, *Muell.-Arg.*—F.B.I., v. p. 291 ; For. Fl. Burma, ii. p. 347.
Chiengmai, in mixed jungle on Doi Sootep, 360 m., *Kerr*, 1402 ; Phre, 120 m., *Luang Vanpruk*, 180.
Distr. Burma.
Lao name, Kow San (ex *Luang Vanpruk*).

Phyllanthus Emblica, *Linn.*—F.B.I., v. p. 289 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 123.
Chiengmai, Doi Sootep, 300–750 m., *Kerr*, 551.
Distr. S.E. Asia.
Lao name, Ma Kam Paum.

Phyllanthus Niruri, *Linn.*—F.B.I., v. p. 298.
Chiengmai, 300 m., *Kerr*, 1444—"a garden weed."
Distr. Tropics except Australia.

Phyllanthus reticulatus, *Poir.*—F.B.I., v. p. 288.
Chiengmai, on rocks by a stream on Doi Sootep, 540 m., *Kerr*, 1131 ; Bangkok, *Zimmermann*, 132.
Distr. E. Asia, Tropical Africa.

Phyllanthus simplex, *Retz.*—F.B.I., v. p. 295.
Chiengmai, in open spots in mixed jungle on Doi Sootep, 300–450 m., *Kerr*, 682.
Distr. E. Asia.

Phyllanthus (Reidia) sootepensis, *Craib*, sp. n., a *P. pulchro*, Muell.-Arg., ramis glabris recedit.

Fruticulus ad 1·2 m. altus (ex *Kerr*), omnino glaber ; rami teretes, ad 3·5 mm. diametro, cortice rubro vel rubro-brunneo irregulariter longitudinaliter fisso obtecti ; ramuli simplices, alterni, teretes, graciles, ad 20 cm. longi. *Folia* plus minusve elliptica, apiculata, basi obtusa, inaequalia, 5–13 mm. longa, 3–7 mm. lata, supra fusca, subtus pallida, rigida, nervis lateralibus utrinque 4–5 intra marginem arcuatis pagina neutra conspicuis ; petioli breves ; stipulae circiter 3 mm. longae. *Flores* ♂ pedicellis 5–6 mm. longis suffulti. *Sepala* 4, subrhomboidea, irregulariter serrata, 1·5 mm. longa, 1·5 mm. lata. *Disci* glandulae 4, sepalis alternae, transverse ellipticae. *Stamina* 4, filamentis in columnam brevem apiculatam (ob ovarii rudimentum ?) connatis. *Flores* ♀ pedicellis ad 7 mm. longis suffulti. *Sepala* 6, anguste obovata, apice rotundata, 1·25 mm. longa, 0·75 mm. lata, glabra. *Disci* glandulae basi plus minusve connatae, ovario dimidio breviores. *Ovarium* 0·75 mm. altum ; styli suberecti, bifidi.
Chiengmai, by a stream on Doi Sootep, 480 m., *Kerr*, 657.

Phyllanthus sp. n. ?
Angkor, *Godefroy-Lebeuf*, 682.

* **Phyllanthodendron album**, *Craib et Hutchinson*, Kew Bull. 1910 p. 279.
Chiengmai, on old clearings on Doi Sootep, 720–810 m., *Kerr*, 521, 566.

Phyllanthodendron mirabile, *Hemsl.*, Hook. Ic. Pl., t. 2563-64. *Phyllanthus mirabilis*, Muell.-Arg.

Bangkok, *Schomburgk.*

The leaf specimens referred to by Williams, Bull. Herb. Boiss., v. (1905) p. 50 evidently do not belong to this species or in fact to *Euphorbiaceae.*

* **Phyllanthodendron roseum**, *Craib et Hutchinson*, Kew Bull. 1910 p. 23 ; Hook. Ic. Pl., t. 2935.

Chiengmai, in evergreen jungle by a stream on Doi Sootep, 730 m., *Kerr*, 697.

var. **siamensis**, *Craib.* *Uranthera siamensis*, Pax et K. Hoffm., Engl. Pflanzenr., Euphorb.—Cluytieae, p. 95.

Chiengmai, Doi Sootep, 1600 m., *Hosseus*, 505.

As noted in Hook. Ic. Pl., l.c. Pax did not feel justified in retaining Hemsley's genus *Phyllanthodendron* and followed Mueller in treating Schomburgk's plant as a *Phyllanthus.* But there is nothing to separate generically the plant collected by Hosseus and made the type of the new genus *Uranthera* by Pax and Hoffmann from Schomburgk's plant. In floral detail Hosseus 505 agrees with the type of *Phyllanthodendron roseum* except that the ovary is glabrous. The petaloid disk glands have been regarded by Pax and Hoffmann as true petals and they have therefore regarded the plant as belonging to the tribe *Cluytieae.*

Fluggea microcarpa, *Blume*—F.B.I., v. p. 238 ; Williams, Bull. Herb. Boiss., v. (1905) p. 29 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 124. *Cicca obovata*, Kurz, For. Fl. Burma, ii. p. 354.

Chiengmai, in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 1116 ; between Kampeng and Wang Djao, *Hosseus*, 22 ; Meh Ping, Muang Hawt, 240 m., *Kerr*, 2015.

Distr. N. India eastwards to China and southwards to Australia, Trop. Africa.

Breynia glauca, *Craib*, sp. n., a *B. fruticosa*, Hook. f., cui affinis, stylis erectis recedit.

Fruticulus omnino glaber ; rami primo compressi, mox teretes, cortice rubro-brunneo striato obtecti ; ramuli teretes, plerumque flexuosi. *Folia* ovato-lanceolata, apice mucronata, basi obtusa vel subrotundata, 2·8–5·5 cm. longa, 1·5–2·7 cm. lata, coriacea, supra sicco brunnea, subtus glauca parceque punctata, nervis lateralibus utrinque 5–6 supra conspicuis vel subobscuris subtus subprominulis intra marginem arcuatis, margine recurvo ; petioli graciles, circiter 3 mm. longi ; stipulae parvae, rigidae, plerumque deciduae. *Floris* ♂ pedicelli 4 mm. longi. *Calyx* turbinatus, 2 mm. longus, lobis inflexis. *Stamina* 3, filamentis in columnam connatis, connectivo breviter producto. *Flores* ♀ breviter pedicellati. *Calycis* tubus 2 mm. longus, 3-angulatus, lobi 6, interiores 1 mm. longi, quam exterioribus paulo majores. *Styli* 3, erecti, apice bifidi, 0·75 mm. alti, ovario 1 mm. alto superne carnoso. *Bacca* depresso-globosa, 5 mm. alta, 8 mm. diametro.

Chiengmai, Doi Sootep, by side of a stream, 450 m., *Kerr*, 864.

Since the above description was drawn up another collection of evidently the same species has been received (*Kerr*, 1126 from Doi Sootep, 840 m.) which differs from the type in the slightly larger

leaves which are not so closely set on the branchlets and the much poorer inflorescence.

Breynia rhamnoides, *Muell.-Arg.*—F.B.I., v. p. 330; For. Fl. Burma, ii. p. 350.

Bangkok, *Zimmermann*, 55.

Distr. S.E. Asia.

Putranjiva Roxburghii, *Wall.*—F.B.I., v. p. 336; For. Fl. Burma, ii. p. 366.

Near Chiengmai, Meh Hia, 330 m., *Kerr*, 1408; Lower Siam, *Witt*, 36.

Distr. India, Burma, Assam.

According to *Witt* a medicine for rheumatism is made out of the leaves and fruit.

Bischofia javanica, *Blume*—F.B.I., v. p. 345; For. Fl. Burma, ii. p. 355.

Muang Prow, Ban Long Kaut, by streams, 600 m., *Kerr*, 1028 ♀; Meh Ping, Chieng Dao, by streams, 390 m., *Kerr*, 1028a ♂.

Distr. S.E. Asia (except Ceylon), Pacific Is.

Daphniphyllum laurinum, *Baill.*—F.B.I., v. p. 353.

Chiengmai, in evergreen jungle on Doi Sootep, 1200–1260 m., *Kerr*, 1824 ♂, 1816 ♀.

Distr. Malaya.

Baccaurea sapida, *Muell.-Arg.*—F.B.I., v. p. 371; For. Fl. Burma, ii. p. 356; Williams, Bull. Herb. Boiss., v. (1905) p. 30, pro parte.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1095; mountains between Lampoon and Lakon, 600 m., *Kerr*, 968; Phre, 240 m., *Luang Vanpruk*, 231; Bangkok, *Schomburgk*, 110, ? *Zimmermann*, 88.

Distr. S.E. Asia.

Lao name, Ma Fai (ex *Kerr*), Ma Foi (Pu) (ex *Luang Vanpruk*).

Aporosa Roxburghii, *Baill.*—F.B.I., v. p. 347; For. Fl. Burma, ii. p. 362.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1689.

Distr. Sikkim Himalayas, Burma, Assam.

Aporosa villosa, *Baill.*—F.B.I., v. p. 345; For. Fl. Burma, ii. p. 361; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 124.

Chiengmai, in deciduous jungle on lower slopes of Doi Sootep, 300–600 m., *Kerr*, 552 ♀, 552a ♂.

Distr. Burma, Cochinchina.

Aporosa Wallichii, *Hook. f.*, F.B.I., v. p. 350.

Chiengmai, in evergreen jungle on Doi Sootep, 750 m., *Kerr*, 1681 ♀, on edge of old clearing on Doi Sootep, 810 m., *Kerr*, 520 ♂.

Distr. Bengal, Assam, Burma.

Aporosa sp. n. ?

Chiengmai, in deciduous jungle on Doi Sootep, 750 m., *Kerr*, 958 —female specimens only collected.

✓ **Antidesma Collettii**, *Craib*, sp. n., ab affini *A. cuspidato*, Muell.-Arg., ovarii rudimento columnari haud globoso, floris ♀ disco glabro fructu majore pedicello longiore crassiore recedit.

Ramuli primo parce ferrugineo-pilosi, mox glabri, cortice rubro-brunneo lenticellato obtecti. *Folia* elliptico-oblanceolata, oblonga

vel raro elliptico-lanceolata, apice plerumque acuminata, acuta, basi cuneata vel rotundata, 7·5–22·5 cm. longa, 2–7 cm. lata, subcoriacea, glabra, nervis lateralibus utrinque 7–9 intra marginem arcuatis supra subprominulis subtus prominulis; petioli ad 1·3 cm. longi. *Spicae* ♂ simplices vel paniculatae, ad 15 cm. longae, breviter pedunculatae; rachis tomentella, plus minusve glabrescens; bracteae lanceolatae, acutae, circiter 1 mm. longae. *Calyx* breviter irregulariter lobatus. *Stamina* 3, filamentis 2·5 mm. longis glabris. *Ovarii* rudimentum columnare, vix 1 mm. altum, parce pubescens. *Racemi* ♀ spiciformes, 7–11 cm. longi, breviter pedunculati; pedicelli circiter 1 mm. longi, pilulosi; bracteae pedicellis dimidio breviores. *Calyx* 1 mm. longus, 1 mm. diametro, breviter lobatus, extra fere glaber, intra subvillosus. *Discus* breviter cupularis, glaber. *Ovarium* glabrum, circiter 1·5 mm. altum; stigmata brevia, terminalia. *Fructus* pedicello 4 mm. longo suffultus, 6–7 mm. longus, 5–6 mm. latus, circiter 4 mm. crassus, rubro-brunneus, lenticellatus.—*A. cuspidatum*, Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 124 *vix* Muell.-Arg.

Burma, Shan Hills, 1500 m., *Collett*, 636 ♂.

Chiengmai, by streams in evergreen jungle on Doi Sootep, 660–900 m., *Kerr*, 1115 (♂), 1117 (♀), 1253 (fruit).

The plant described above is probably more nearly related to *A. Bunius*, Spreng., than to *A. cuspidatum*, Muell.-Arg. From the former it differs in its larger leaves and by the ovary which in *A. Bunius* is long exserted but in *A. Collettii* is included in the calyx to about the middle. *A. Bunius* and *A. Collettii* have very similar male flowers and inflorescences.

Antidesma diandrum, *Roth*.—F.B.I., v. p. 361; For. Fl. Burma, ii. p. 360; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 125.

Chiengmai, in deciduous jungle on lower slopes of Doi Sootep, 300–600 m., *Kerr*, 608, 608a.

Distr. India, Burma, Assam.

Antidesma Kerrii, *Craib*, sp. n., *A. nigrescenti*, Tul., similis sed ovario haud glabro facile distinguenda.

Arbuscula ad 7·5 m. alta (ex *Kerr*); ramuli juventute densius molliter pubescentes, pilis plus minusve persistentibus. *Folia* oblonga, oblongo-elliptica vel elliptico-oblanceolata, apice acuminata, acuta, basi obtusa vel subrotundata, 4–12 cm. longa, 1·5–4·3 cm. lata, chartacea, utrinque costa nervisque sed costa densius pubescentia, nervis lateralibus utrinque 7–8 intra marginem arcuatis supra conspicuis subtus prominentibus nervis transversis paucis subtus prominulis; petioli ad 6 mm. longi, indumento ut in ramulis; stipulae lineares, ad 3 mm. longae, dorso pubescentes. *Racemi* ♂ solitarii vel parum paniculati, vix 3 cm. longi, laxi; pedicelli 0·5 mm. longi, bracteis pedicellis subaequalibus. *Sepala* 4, 0·5 mm. longa, 0·75 mm. lata. *Discus* cum ovarii rudimento parvo glaber. *Stamina* 4, filamentis circiter 1 mm. longis glabris. *Spicae* ♀ solitariae, terminales, densiusculae; bracteae calycem subaequantes. *Calycis* circiter 0·5 mm. longi segmenta 4, dentata. *Discus* annularis, carnosus, glaber. *Ovarium* longe exsertum, oblique ellipsoideum, 1 mm. altum, parce appresse pilulosum.

Chiengmai, in thick evergreen jungle on Doi Sootep, 1200 m., *Kerr*, 618 ♂, 618a ♀.

Antidesma sootepensis, *Craib*, sp. n., *A. Moritzii*, Muell.-Arg., peraffinis sed stipulis omnibus deciduis, foliis minoribus, spicis ♂ densis, calyce filamentis antheris ovariique rudimento longioribus, bracteis ♀ minoribus, calyce breviore, ovario minore magis globoso haud tam exserto differt.

Suffrutex 3–3·5 m. altus (ex *Kerr*); ramuli primo ferrugineo-tomentelli, mox glabri vel subglabri, cortice rubro-brunneo parce lenticellato obtecti. *Folia* plerumque oblonga vel oblongo-oblanceolata, apice acuminata, acuta, rarissime obtusa, basi cuneata, 3–12·2 cm. longa, 1–2·9 cm. lata, chartacea, utrinque costa nervisque pubescentia et cetera subtus parcissime pubescentia, margine ciliata, nervis lateralibus utrinque 6–7 intra marginem arcuatis supra conspicuis subtus prominentibus nervis transversis supra conspicuis; petioli 2–4 mm. longi, indumento ramulorum. *Spicae* ♂ terminales, paniculatae, ad 10 cm. longae, densae, pedunculo circiter 1 cm. longo suffultae, pedunculo ut in rachi tomentello. *Calyx* 4-lobatus, circiter 0·5 mm. altus, extra pubescens. *Discus* glaber; ovarii rudimentum columnare, parcissime pubescens. *Stamina* 4, filamentis fere 1·5 mm. longis glabris. *Racemi* ♀ simplices, ad 5 cm. longi, pedunculo communi circiter 1 cm. longo suffulti; pedicelli validi, 0·5 mm. longi, pilulosi; bracteae parvae. *Calyx* ad 0·75 mm. longus, 4-lobatus, utrinque pubescens. *Discus* cupularis, subglaber. *Ovarium* anguste ellipsoideum, 0·75 mm. altum, glabrum.

Chiengmai, in deciduous jungle on Doi Sootep, 720–750 m., *Kerr*, 676♂, 676a♀.

In describing the above species, which is very closely allied to *A. Moritzii*, I have taken into consideration *A. Moritzii* only as originally described by Mueller.

Jatropha gossypifolia, *Linn.*—F.B.I., v. p. 383.

Chiengmai, 300 m., *Kerr*, 712—"often abundant on waste ground."

Distr. Tropics.

Kerr's plant belongs to the variety *elegans*, Muell.-Arg.—Pax, Engl. Pflanzenr., Euphorb.-Jatroph., p. 26. Pax l.c. p. 50 refers Zimmermann's 27 and 145 to *J. pandurifolia*, Andr., var. *latifolia*, Pax, but it would probably be equally right to follow Williams and refer them to *J. hastata*, Jacq.

Croton Cumingii, *Muell.-Arg.*

Lem Tong Lan, *Murton*, 122; Bangkok Palace Gardens, cultivated, *Murton*, 8.

Distr. Philippines, Malay Peninsula.

Croton Hutchinsonianus, *Hosseus*.

Wang Djao, *Hosseus*, 163 (Herb. Kew! Hoss.! et Copenhagen!); Phre, 120–180 m., *Luang Vanpruk*, 140.

Croton laevifolius, *Blume*, var.?

Chiengmai, Doi Sootep, in evergreen jungle, 660 m., *Kerr*, 1074.

There is no type of this species in Herb. Kew. The Siam plant differs from the Khasia specimens, referred here by Mueller, in the indumentum which, though of a similar nature, is more persistent and more pronounced on the inflorescence.

Croton oblongifolius, *Roxb.*—F.B.I., v. p. 386 ; For. Fl. Burma, ii. p. 373 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 125, p.p.

Banks of streams at foot of Doi Sootep, 330 m., *Kerr*, 528 ; Chiengmai Plain, in scrub jungle, 300 m., *Kerr*, 528a, 528b ; Phre, 156–240 m., *Luang Vanpruk*, 125.

Croton robustus, *Kurz*, For. Fl. Burma, ii. p. 372 ; F.B.I., v. p. 387 ?

Chiengmai, Doi Sootep, 660–800 m., *Hosseus*, 296 (Herb. Kew ! et Copenhagen !), *Kerr*, 943, 1778.

Distr. Burma.

Trigonostemon Murtoni, *Craib*, sp. n., a *T. villoso*, Hook. f., foliis supra glabris subtus costa nervisque strigosis recedit.

Ramuli primo hirsuti, demum glabri, cortice brunneo obtecti. *Folia* oblanceolata vel oblongo-oblanceolata, apice acuminata, obtusa, basi obtusa vel truncata, 3·5–14 cm. longa, 1·1–4 cm. lata, supra glabra, subtus juventute costa nervisque strigosa, rigide chartacea, margine obscure denticulata, nervis lateralibus utrinque ad 13 intra marginem arcuatis supra conspicuis subtus prominentibus ; petioli ad 7 mm. longi, supra canaliculati, plus minusve glabrescentes. *Racemi* axillares, 2–3 cm. longi, pedunculo communi ad 3 cm. longo suffulti ; bracteae foliaceae, 1 cm. longae, 2 mm. latae, supra costa tantum, subtus parcius strigillosae. *Flos* ♂. *Sepala* 5, lineari-lanceolata, acuta, subaequalia, circiter 3 mm. longa, 1 mm. lata, extra strigosa, intra glabra. *Petala* 5, oblongo-obovata, subaequalia, ad 3·5 mm. longa, 1·75 mm. lata, parce setoso-ciliata. *Disci* glandulae 5, parvae, glabrae. *Filamenta*, nisi parte apicali brevissima libera, in columnam 0·75 mm. altam connata ; antherae 3. *Flos* ♀. *Sepala* 5, subaequalia, lanceolata, acutiuscula, extra pubescentia, intra glabra. *Petala* 5, inaequalia, elliptica vel obovato-oblonga, parcissime setosa. *Ovarium* hirsutum ; styli circiter ad medium bifidi.

Koh Klone, *Murton*, 18.

The description of the female flower is drawn up from sketches by Sir J. D. Hooker on the sheet.

Trigonostemon reidioides, *Craib*, comb. nov. *Baliospermum reidioides*, Kurz—For. Fl. Burma, ii. p. 411 ; Williams, Bull. Herb. Boiss., v. (1905) p. 32.

Kanburi, *Teysmann*, 5981 H.B. ex Hb. Kurz.

The date 1878 quoted by Williams l.c. is the date of receipt of the specimen at Kew from Calcutta and not the date of collection of the specimen.

Ostodes Kerrii, *Craib*, sp. n., ab *O. paniculato*, Blume, foliis subtus in costarum axillis glabris, seminibus minoribus brunneis haud pictis, ab *O. thyrsantho*, Pax, inflorescentiae rachi glabra, pedicellis distincte articulatis, capsula rostrata differt.

Arbor dioica, 6–9 m. alta (ex *Kerr*) ; ramuli validi, primo parce appresse pilulosi, mox glabri. *Folia* ovato-lanceolata, elliptico-lanceolata vel lanceolata, apice acuminata, obtusiuscula, basi obtusa, 9–32·5 cm. longa, 3–11·8 cm. lata, chartacea, margine glanduloso-serrulata, supra glabra, subtus costa nervisque pilis brevibus perpaucis deciduis instructa, cetera glabra, nervis lateralibus utrinque 8–12 intra marginem arcuatis supra conspicuis subtus

prominulis, basi biglandulosa, petiolis 1·3–2·5 cm. longis glabris vel subglabris suffulta. *Flores* ♂ in paniculas axillares dispositi; pedunculi communes 2–5·5 cm. longi; rachis 6–14 cm. longa, glabra; ramuli laterales ad 10, 3 cm. longi, circiter 5-flori; pedicelli ad 5 mm. longi, infra medium articulati; bracteae minutae. *Calyx* 5-partitus, segmentis inaequalibus ad 6·5 mm. longis, exterioribus extra parce pilulosis. *Petala* 5, alba, 7 mm. longa, 4·5 mm. lata, intus inferne pubescentia. *Disci* glandulae 1 mm. altae, 1·5 mm. latae, carnosae, subglabrae. *Stamina* circiter 30, filamentis inferne villosis. *Flores* ♀ in racemos plerumque ex axillis veteribus oriundos dispositi; racemi ad 15 cm. longi, pauciflori, glabri, pedunculo brevi suffulti; pedicelli 1 cm. vix attingentes, medio articulati; bracteae parvae. *Calycis* segmenta ad 9 mm. longa, 7 mm. lata. *Petala* subaequalia, obovata vel subrotundata, ad 9 mm. longa, 8 mm. lata, intus inferne hirsutula. *Ovarium* dense albido-setosum, 5 mm. altum, 5 mm. diametro; styli 3, validi, 6 mm. longi, dorso hirsuti. *Capsula* vix 2·5 cm. alta, dura, ferrugineo-tomentella parceque setosa. *Semina* dorso carinata, circiter 1·2 mm. longa et lata, 9 mm. crassa, brunnea.

Chiengmai, in evergreen jungle by streams on Doi Sootep, 660 m., *Kerr*, 1719 ♂, 750 m., *Kerr*, 1091 ♀, 720 m., *Kerr*, 1432 (fruit).

Mercurialis leiocarpa, *Sieb. et Zucc.*

Doi Intanon, 2560 m., *Hosseus*, 359a (Herb. Kew! Hoss.! Copenhagen!).

Distr. Japan, China.

Acalypha Kerrii, *Craib*, sp. n., *A. acmophyllae*, Hemsl., valde affinis sed petiolis brevioribus, floris ♀ bracteis transverse oblongis paucidentatis eiusque perianthii segmentis latioribus, stylis longioribus distinguenda.

Arbor parva (ex *Kerr*); ramuli primo tenuiter tomentelli, mox glabri, cortice rubro-brunneo striato interdum lenticellato obtecti. *Folia* ovata vel lanceolata, apice acuminata, acutiuscula, basi obtusa vel rotundata, 3·5–12·5 cm. longa, 1·5–7 cm. lata, tenuiter chartacea, serrata, supra matura glabra, pustulata, infra, costa nervisque praecipue, pubescentia, e basi trinervia, nervis secondariis (e costa ortis) utrinque 4–5 pagina utraque, inferiore magis, prominulis; petioli 0·5–3·5 cm. longi, indumento ramulorum; stipulae deciduae, lineares, apice attenuatae, ad 9 mm. longae, dorso parce pubescentes. *Spicae* axillares, androgynae, floribus ♀ 2–3 basin versus solitariis, ♂ fasciculatis, ad 3 cm. longae, pubescentes. *Flores* ♂ perfecti deficientes. *Bracteae* ovato-triangulares, concavae, circiter 0·5 mm. longae. *Flores* ♀ interdum solitarii, axillares (ob spicas ♂ delapsas?). *Bracteae* transverse oblongae, 4–5-dentatae, 2·5–3 mm. longae, 4–5 mm. latae, dorso parce pubescentes. *Calycis* segmenta deltoidea, obtusa, 0·75 mm. longa, 0·5 mm. lata. *Ovarium* hispidum, 0·75 mm. diametro; styli laciniati, ad 4 mm. longi, glabri.

Chiengmai, in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 1165.

Alchornea rugosa, *Muell.-Arg.*—F.B.I., v. p. 422; For. Fl. Burma, ii. p. 385.

Huai Tuam, 180 m., *Luang Vanpruk*, 227; Me Youak Phre, 240 m., *Luang Vanpruk*, 235.

Distr. Indo-China, Malaya.

Lao Name, Khang Poi (ex *Luang Vanpruk*).

Alchornea tiliaefolia, *Muell.-Arg.*—F.B.I., v. p. 421 ; For. Fl. Burma, ii. p. 386.

Chiengmai, by stream in evergreen jungle on Doi Sootep, 750 m., *Kerr*, 639.

Distr. Sikkim, Assam, Burma.

Trewia nudiflora, *Linn.*—F.B.I., v. p. 423 ; For. Fl. Burma, ii. p. 379.

Near Lampoon, by a stream, 360 m., *Kerr*, 967 ; Phre, 156–240 m., *Luang Vanpruk*, 123.

Distr. India, Assam, Burma, Malaya.

Cleidion javanicum, *Blume*—F.B.I., v. p. 444 ; For. Fl. Burma, ii. p. 390 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 125.

Muang Prow, Hooey Meh Wăh, by a stream, 540 m., *Kerr*, 1040 ; Chiengmai, cultivated, 300 m., *Kerr*, 1082 ; Me Youak Phre, 240 m., *Luang Vanpruk*, 233.

Distr. S.E. Asia.

Lao name Mă Di Mi (ex *Kerr*), Madumu (ex *Luang Vanpruk*).

According to Kerr an oil is extracted from the fruit.

To this species belong the specimen collected by Collett and referred by Collett and Hemsley, l.c. to *Croton oblongifolius*, Roxb. and the specimen from Mu Valley collected by Smales referred to *Mallotus khasianus*, Hook. f. in Brandis, Indian Trees p. 589.

Mallotus cochinchinensis, *Lour.*—F.B.I., v. p. 430. *M. paniculatus*, Muell.-Arg.— For. Fl. Burma, ii. p. 383.

Chiengmai, Doi Sootep, by a stream in evergreen jungle, 720 m., *Kerr*, 1433.

Distr. China to Malay Archipelago.

Mallotus repandus, *Muell.-Arg.*—F.B.I., v. p. 442 ; For. Fl. Burma, ii. p. 380.

Chiengmai, in scrub jungle, 300 m., *Kerr*, 1672.

Distr. S.E. Asia.

Macaranga Andersoni, *Craib*, nom. nov. *M. membranacea*, Kurz, Journ. As. Soc. Beng., xlii. (1873) p. 246 ; For. Fl. Burma, ii. p. 389 saltem pro parte, *non* Muell.-Arg. (1866).

Yunnan, Tut Yower, *D. J. Anderson*, 22/9/1868.

Chiengmai, in evergreen jungle on Doi Sootep, 1050–1200 m., *Kerr*, 1187, 1187*a*.

Of the type of Kurz's *M. membranacea* there is only a flowerless specimen in Herb. Kew. This particular specimen has all the leaves lobed. The specimen collected by Anderson which agrees exactly with those collected by Kerr shows no trace of lobing in the leaves and is named *M. membranacea* in Kurz's own handwriting. The specimens collected by Anderson, although not quoted by Kurz in his original description, probably were used by him in his description at least so far as the simple leaves are concerned. In all probability Kurz's description includes two species the Burmese one with lobed leaves and the Yunnan-Siam one with simple leaves for which the writer proposes the name *M. Andersoni*.

Macaranga denticulata, *Muell.-Arg.*—F.B.I., v. p. 446; For. Fl. Burma, ii. p. 287.

Chiengmai, by a stream in evergreen jungle on Doi Sootep, 750–900 m., *Kerr*, 1093.

Distr. Himalayas, Indo-China, Malaya.

Homonoia riparia, *Lour.*—F.B.I., v. p. 455; For. Fl. Burma, ii. p. 401; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 126.

Meh Ping Banks, 150–350 m., *Kerr*, 506, *Hosseus*, 375; near Lakon, 300 m., *Kerr*, 975; Paknampo, common along River Menam, *Witt*, 11, 12.

Distr. S.E. Asia.

Lao name, Kai (ex *Kerr*).

Baliospermum axillare, *Blume*—F.B.I., v. p. 461; Williams, Bull. Herb. Boiss., v. (1905) p. 32; Coll. et. Hemsl., Journ. Linn. Soc., xxviii. p. 126. *B. montanum*, Muell.-Arg.—For. Fl. Burma, ii. p. 410.

Chiengmai, 300 m., on waste ground, *Kerr*, 942; Wang Djao, *Lindhard*, 77; Bangkok, *Schomburgk*, 134.

Distr. S.E. Asia (except Ceylon).

Baliospermum siamense, *Craib*, sp. n., ab affini *B. calycino*, Muell.-Arg., petiolis inflorescentiisque brevioribus, floris ♀ sepalis latioribus, ovario subglabro, stylis suberectis gracilioribus recedit.

Fruticulus monoicus vel dioicus, simplex, 1·2–1·5 m. altus (ex *Kerr*); caules primo appresse pubescentes et parce setosi, mox glabri. *Folia* plerumque oblanceolata vel anguste oblonga, apice acuminata, acuta, basi obtusa vel subrotundata, 8–23 cm. longa, 2·2–6·6 cm. lata, tenuiter chartacea, margine crasse distanter glanduloso-serrata vel rarissime subintegra, supra glabra vel costa tantum parcissime setosa, subtus costa nervisque lateralibus setosa, nervis transversis pilosula, nervis lateralibus utrinque 7–12 intra marginem arcuatis, supra conspicuis subtus prominulis, nervis transversis utrinque, subtus magis, conspicuis; petioli 0·8–5 cm. longi, indumento ut in caulibus. *Paniculae* ♂ axillares, quam foliis multo breviores, ad 4 cm. longae, angustae, pedunculo communi ad 5 cm. longo suffultae, pilosulae; pedicelli vix 4 mm. attingentes; bracteae parvae. *Sepala* 5, suborbicularia, concava, circiter 1·5 mm. longa, membranacea, extra parce pilosula. *Stamina* ± 20, filamentis liberis circiter 2 mm. longis glabris. *Paniculae* ♀ axillares, pauciflorae, pedunculo ad 2·5 cm. longo suffultae; pedicelli ad 4 mm. longi; bracteae parvae. *Sepala* 5, variabilia, subaequalia, plerumque ovato-lanceolata, acuta, ad 4 mm. longa, 2 mm. lata, irregulariter pauci-serrata vel subintegra, dorso appresse pilosula, fructescentia fere 1 cm. longitudinis attingentia. *Ovarium* 0·75 mm. altum, subglabrum; styli 3, basi breviter connati, apice bifidi. *Capsula* glabra, 7 mm. alta; semina brunnea, 5 mm. longa, 3·5 mm. diametro.

Chiengmai in evergreen jungle on Doi Sootep, 1200–1260 m., *Kerr*, 790 (all dioecious), *Kerr*, 1365 (part monoecious, part dioecious).

Sapium insigne, *Benth.*—F.B.I., v. p. 471. *Carumbium insigne*, Kurz, For. Fl. Burma, ii. p. 412.

Muang Prow, Meh Kaut, 450 m., *Kerr*, 1031.

Distr. Himalayas, Bengal, Burma.

Sebastiana Chamælea, *Muell.-Arg.*—F.B.I., v. p. 475.
Cape Liant, *Murton*, 27.
Distr. China southwards to Australia and westward to Trop. Africa.

Ulmaceae.

Holoptelea integrifolia, *Pl.*—F.B.I., v. p. 481 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 126. *Ulmus integrifolia*, Roxb.—For. Fl. Burma, ii. p. 473.
Phre, Hooey Kamin, *Kerr*, 990.
Distr. India, Burma (? W. Trop. Africa).

Trema amboinensis, *Blume*—F.B.I., v. p. 484 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 126 ; Williams, Bull. Herb. Boiss., iv. (1904) p. 1030. *T. orientalis*, Blume, var. *amboinensis*, Kurz, For. Fl. Burma, ii. p. 468.
Chiengmai, in evergreen jungle on Doi Sootep, 600–900 m., *Kerr*, 628, 1293 ; Phre, Hooey Kamin, 180 m., *Luang Vanpruk*, 208.
Distr. Sikkim, Assam southwards to Malaya.
Lao name, Paw Fan (ex *Luang Vanpruk*).

Moraceae.

Streblus asper, *Lour.*—F.B.I., v. p. 489 ; For. Fl. Burma, ii. p. 464 ; Williams, Bull. Herb. Boiss., iv. (1904) p. 1029.
Meh Teng, Ban Pou, 390 m., *Kerr*, 1061 ; Bangkok, *Schomburgk*, 146, *Gould*, *Zimmermann*, 91.
Distr. E. Asia.
Lao name, Koi (ex *Kerr*).

Broussonetia papyrifera, *Vent.*—F.B.I., v. p. 490 ; For. Fl. Burma, ii. p. 467.
Phre 120–180 m., *Luang Vanpruk*, 139 ♂ ; between Lakon and Phre, near Pang Pooey, 420 m., *Kerr*, 1000 ♀.
Distr. E. Asia, Pacific Is.—often cultivated.
Lao name, Mai Sah (ex *Kerr*).

Allaeanthus Kurzii, *Hook. f.*, F.B.I., v. p. 490. *Malaisa tortuosa*, Kurz, For. Fl. Burma, ii. p. 466, *non* Blume.
Doi Saket, Ban Sun Pah Suk, 600 m., *Kerr*, 970 a ♂ ; Lakon, Pak Kaung Nai, 300 m., *Kerr*, 970 ♀.
Distr. Burma, Assam.
Lao name, ♂ Dauk Să Laa : ♀ Mai Să Laa.

Morus laevigata, *Wall.*—F.B.I., v. p. 492 ; For. Fl. Burma, ii. p. 467.
Phre, 120–240 m., *Luang Vanpruk*, 193 ; Chiengmai, in evergreen jungle on Doi Sootep, 660 m., *Kerr*, 1736. ? Bangkok, *Schomburgh*.
Distr. Himalayas, Burma, Assam.
Lao name, Mawn (ex *Luang Vanpruk*).

Ficus crininervia, *Miq.*—F.B.I., v. p. 529 ; King, Ann. Roy. ot. Gard. Calc., i. p. 138 t. 173.
Chiengmai, creeping over rocks by a stream on Doi Sootep, 390 m., *Kerr*, 1240.
Distr. Assam.

Ficus fistulosa, *Reinw.*—F.B.I., v. p. 525; For. Fl. Burma, ii. p. 459 pro parte; King, Ann. Roy. Bot. Gard. Calc., i. p. 114 tt. 150, 151.

Chiengmai, on old clearing on Doi Sootep, 750 m., *Kerr*, 1793.

Distr. Bengal, Assam, Malaya.

Ficus hirta, *Vahl*—F.B.I., v. p. 531; For. Fl. Burma, ii. p. 449; King, Ann. Roy. Bot. Gard. Calc. i. p. 149 t. 188.

Chiengmai, in evergreen jungle on Doi Sootep, 900 m., *Kerr*, 701.

Distr. S.E. Asia.

Ficus hispida, *Linn. f.* —F.B.I., v. p. 522; For. Fl. Burma, ii. p. 460; Williams, Bull. Herb. Boiss., iv. (1904) p. 1029: King, Ann. Roy. Bot. Gard. Calc., i. p. 116 tt. 154, 155.

Common along rivers in Lower Siam, *Witt*, 41.

Distr. S.E. Asia, Australia.

Ficus laevis, *Blume*—F.B.I., v. p. 526; King, Ann. Roy. Bot. Gard. Calc., i. p. 128 t. 161.

Chiengmai, on edge of old clearing on Doi Sootep, 660 m., *Kerr*, 1203; in evergreen jungle by a stream, 900 m., *Kerr*, 1739.

Distr. Himalayas, Assam, Tonkin, Malaya.

Ficus obtusifolia, *Roxb.*—F.B.I., v. p. 507; For. Fl. Burma, ii. p. 443; King, Ann. Roy. Bot. Gard. Calc., i. p. 42 tt. 49, 84g.

Chiengmai, Doi Sootep, 450–660 m., *Kerr*, 517, 1783.

Distr. E. Himalayas, Assam, Burma, Perak.

Ficus pyriformis, *Hook. et Arn.*, var. **ischnopoda,** *King*, F.B.I., v. p. 533, Ann. Roy. Bot. Gard. Calc., i. p. 158 t. 201c; Williams, Bull. Herb. Boiss., iv. (1904) p. 1030.

Chiengmai, on edge of marshy ground on Doi Sootep, 300 m., *Kerr*, 717; Koh Chang, Klong Majum, *Schmidt*, 617a.

Distr. Khasia, Burma, Malaya.

Ficus saemocarpa, *Miq.*—F.B.I., v. p. 523; King, Ann. Roy. Bot. Gard. Calc., i. p. 115 t. 152. *F. pyrrhocarpa*, Kurz, For. Fl. Burma, ii. p. 424.

Chiengmai, by edge of mountain streams on Doi Sootep, 720–1200 m., *Kerr*, 592.

Distr. Himalayas, Assam, Burma.

Lao name, Dooa hohey.

Kerr's plant is identical with the type of *F. pyrrhocarpa*, Kurz in Herb. Kew.

Ficus scandens, *Roxb.*—F.B.I., v. p. 526; For. Fl. Burma, ii. p. 455; King, Ann. Roy. Bot. Gard. Calc., i. p. 129 t. 162.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1829.

Distr. N. India, Assam, Burma.

Urticaceae.

Fleurya interrupta, *Gaud.*—F.B.I., v. p. 548.

Chiengmai, 300 m., *Kerr*, 1345—"a garden weed."

Distr. Abyssinia, E. Asia, Pacific Is.

Girardinia heterophylla, *Dcne.*—F.B.I., v. p. 550.

Chiengmai, Doi Sootep, 1500 m., *Kerr*, 1106.

Distr. India, Burma, Assam, Java, Trop. Africa.

Pilea anisophylla, *Wedd.*—F.B.I., v. p. 552.
Chiengmai, Doi Sootep, *Hosseus*, 199.
Distr. Himalayas, Assam, (? Yunnan).

Pilea sp.—♂ only.
Chiengmai, Doi Sootep, in evergreen jungle, 1650 m., *Kerr*, 1323.

Pellionia Daveauana, *N. E. Brown*, var. **viridis**, *N. E. Brown*.
Chiengmai, creeping over rocks and humus near a stream on Doi Sootep, 660 m., *Kerr*, 1277.
Distr. Cochinchina.

Boehmeria macrophylla, *Don*—F.B.I., v. p. 577 ; For. Fl. Burma, ii. p. 424.
Chiengmai, Doi Sootep, 660 m., *Kerr*, 865.
Distr. Himalayas, Burma, Assam.

Pouzolzia viminea, *Wedd.*—F.B.I., v. p. 581 ; For. Fl. Burma, ii. p. 425 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 127.
Chiengmai, Doi Sootep, 660–960 m., *Kerr*, 1255, 1276.
Distr. India, S. China, Indo-China, Malaya.

Debregeasia longifolia, *Wedd.* *D. velutina*, Wedd.—F.B.I., v. p. 590 ; For. Fl. Burma, ii. p. 428.
Chiengmai, Doi Sootep, in evergreen jungle, 1650 m., *Kerr*, 1506.
Distr. S.E. Asia.

Villebrunea integrifolia, *Gaud.*, var. **sylvatica**, *Hook. f.*, F.B.I., v. p. 590. *Oreochnide sylvatica*, Miq.—For. Fl. Burma, ii. p. 427.
Chiengmai, in evergreen jungle by a stream on Doi Sootep, 900 m., *Kerr*, 1158.
Distr. India, Burma, Assam, Malaya.

Juglandaceae.

Engelhardtia aceriflora, *Blume*—F.B.I., v. p. 596.
Chiengmai, Doi Sootep, in evergreen jungle, 750–1050 m., *Kerr*, 955.
Distr. E. Himalayas, Yunnan, Malay Archipelago.
Lao name, Pah Hoht.

Engelhardtia Colebrookiana, *Lindl.*—F.B.I., v. p. 596 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 127. *E. villosa*, Kurz, For. Fl. Burma, ii. p. 491.
Phre, 156–240 m., *Luang Vanpruk*, 115.
Distr. Himalayas, China, Indo-China, Java.
Probably only a variety of the next species.

Engelhardtia spicata, *Blume*—F.B.I., v. p. 595 ; For. Fl. Burma, ii. p. 491 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 128.
Chiengmai, Doi Sootep, 330–700 m., *Kerr*, 531, *Hosseus*, 303.
Distr. N. India, Indo-China, Java.

Betulaceae.

Carpinus Londoniana, *H. Winkler*, Engler Pflanzenr., Betulaceae, p. 32, vel ei valde affinis.
Chiengmai, Doi Sootep, by stream in oak jungle, 660 m., *Kerr*, 511.
Distr. Yunnan.

Cupuliferae.

Quercus fenestrata, *Roxb.*—F.B.I., v. p. 608; For. Fl. Burma, ii. p. 483; King, Ann. Roy. Bot. Gard. Calc., ii. p. 45 t. 39.

Chiengmai, in open grassy jungle on Doi Sootep, 1560 m., *Kerr*, 1320; ? in open jungle, 1350 m., *Kerr*, 708 (very young fruit); ? 660 m., *Kerr*, 1086 (in flower).

Distr. E. Himalayas, Burma, Assam.

Quercus Garrettiana, *Craib*, sp. n., *Q. Skanianae*, Dunn, facie similis sed cupularum squamis haud parvis haud appressis facile distinguenda.

Arbor 9-metralis (ex *Kerr*); ramuli dense fulvo-tomentosi. *Folia* oblanceolata vel oblongo-oblanceolata, apice acuminata, acuta, basi attenuata, 8–22·5 cm. longa, 2·6—5·8 cm. lata, subcoriacea, margine integro recurvo, supra primo, costa densius, pilulosa, mox glabra vel subglabra nisi costa tomentella, subtus parce pubescentia, nervis lateralibus utrinque 12–13 supra conspicuis subtus prominentibus nervis transversis subtus prominulis; petioli ad 1·3 cm. longi, indumento ut in ramulis. *Spicae* ♀ rigidae, erectae, rachi fulvo-tomentella, ♂ haud visae. *Cupulae* sessiles, confertae; involucri squamae basi connatae, subulatae, circiter 5 mm. longae, reflexae, appresse pubescentes. *Glans* fere omnino inclusa, ovoideo-conica, apiculata, circiter 1·3 cm. alta, 1–1·2 cm. diametro, glabra.

Chiengmai, Doi Sootep, 600–750 m., *Kerr*, 1185, 1185a.

Quercus Junghuhnii, *Miq.*—King, Ann. Roy. Bot. Gard. Calc., ii. p. 78 t. 73.

Chiengmai, Doi Sootep, 900–1200 m., *Kerr*, 817, *Hosseus*, 307.

Distr. Java, Formosa.

Lao name, Măkaw Dohey (ex *Kerr*).

The nut is eaten and greatly esteemed by the natives (*Kerr*, Kew Bull. 1911, p. 5).

Quercus (Cyclobalanopsis) Kerrii, *Craib*, sp. n., a *Q. velutina*, Lindl., foliis majoribus haud acute acuminatis nervis lateralibus ad marginem subrectis haud curvatis recedit.

Arbor mediocris (ex *Kerr*); ramuli primo valde sulcati, dense fulvo-tomentosi, indumento diu persistente, mox teretes. *Folia* lanceolata, oblonga vel oblongo-lanceolata, apice obtusa, basi interdum inaequalia, cuneata vel subrotundata, 9–23·5 cm. longa, 3–7·5 cm. lata, subcoriacea, juvenilia utrinque dense tomentosa, supra costa fulva excepta purpurea, matura utrinque, costa subtus nonnunquam flocculenta excepta, glabra, nervis lateralibus utrinque 14 ad marginem subrectis supra conspicuis subtus prominentibus nervis transversis subprominulis, margine, parte basali integra excepta, serrata vel crenato-serrata; petioli 1–1·8 cm. longi, indumento ramulorum; stipulae fugaces, ad 1 cm. longae. *Spicae* ♂ ad ramorum apices confertae; bracteae lineares, acutae, 3 mm. longae, 0·75 mm. latae, dorso appresse pubescentes, ciliatae. *Filamenta* brevia; antherae hirsutiusculae. *Spicae* ♀ in ramulis axillares, solitariae. *Cupulae* sessiles, patelliformes, ad 8 mm. altae, 2·2 cm. diametro, extra conspicue appresse pubescentes; lamellae circiter 8, denticulatae. *Glans* (an matura ?) ad 7 mm. alta, vix 2 cm. diametro, apice depressa, apiculata, vix glabra.

Chiengmai, in deciduous jungle on lower slopes of Doi Sootep, 300–600 m., *Kerr*, 550 ; Doi Sootep, 1000 m., *Hosseus*, 438.

Distr. ? Martaban, *Kurz*, 996.—There is no fruit attached to this specimen, which, except that the leaves are rather longer cuneate at the base agrees well with the Siamese plant.

From *Q. Helferiana* and *Q. Brandisiana* the plant described above is readily distinguished by the lateral leaf nerves which are narrow and subprominent on the upper surface, and by the narrow costa which is not depressed.

Quercus (Lepidobalanus) Kingiana, *Craib*, sp. n., a *Q. incana*, Roxb., foliis subtus parce stellato-pubescentibus marginibus a medio apicem versus plus minusve crasse dentato-serratis distinguenda.

Arbor mediocris (ex *Kerr*) ; ramuli juventute dense fulvo-tomentelli, mox glabri, cortice lenticellato. *Folia* oblonga vel obovato-oblonga, apice obtusa, basi inaequalia, truncata vel obtuse cuneata, 5·5–14·7 cm. longa, 3–7·2 cm. lata, fere a medio apicem versus crasse dentato-serrata, juvenilia supra parce fulvo-pilulosa, subtus densius stellato-pubescentia, matura rigide chartacea, supra glabra, subtus parce stellato-pubescentia, nervis lateralibus utrinque 10–11 supra sicco subprominulis subtus prominentibus nervis transversis uti reticulatione gracili utrinque conspicuis ; petioli ad 2 cm. longi, tomentelli ; stipulae lineari-oblanceolatae, vix 1. cm. longae, dorso sericeae. *Spicae* ♂ ad ramorum apices confertae ; bracteae 1·5 mm. longae, ciliatae ; perianthium 1·5 mm. altum, lobis apice rotundatis ; filamenta perianthio subaequalia, glabra, antheris 1·25 mm. longis. *Cupulae* sessiles, circiter 1·5 cm. altae, 2 cm. diametro, squamis dorso subsericeis nisi apice subglabris. *Glans* (vix matura) inclusa.

Chiengmai, Doi Sootep, in open jungle, 750–900 m., *Kerr*, 956, 1284.

Lao name, Kau Tum Moo.

Closely allied to this species is *Hosseus*, 300, from Doi Sootep, 1300–1500 m., but is represented at Kew by flowering material only.

Quercus Lindleyana, *Wall.*—F.B.I., v. p. 607 ; For. Fl. Burma, ii. p. 486 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 39 t. 55.

Chiengmai, Doi Sootep, 840–1500 m., *Kerr*, 1163, 1965, *Hosseus*, 625.

Distr. Burma.

Quercus polystachya, *Wall.*—F.B.I., v. p. 610 ; For. Fl. Burma, ii. p. 485 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 50 t. 44. *Q. bancana*, Kurz, For. Fl. Burma, ii. p. 485, *non* Scheff. (fide *King*).

Chiengmai, in eng jungle on Doi Sootep, 300 m., *Kerr*, 796.

Distr. Burma, Yunnan, Hong Kong.

Quercus semiserrata, *Roxb.*—F.B.I., v. p. 604 ; For. Fl. Burma, ii. p. 488 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 68 t. 22.

Chiengmai, Doi Sootep, in evergreen jungle, 900 m., *Kerr*, 1113, 1644.

Distr. Burma, Assam.

Quercus (Cyclobolanus) sootepensis, *Craib*, sp. n., a *Q. Cantleyana*, King, fructibus semper solitariis pedicellis longioribus gracilioribus suffultis, rachi tenuiore tomentella recedit.

Arbor mediocris (ex *Kerr*), ramulis cortice brunneo vel griseo-brunneo obtectis. *Folia* elliptica, anguste elliptica vel oblongo-ovata, apice caudata, obtusa, basi cuneata vel subrotundata,

9–17·5 cm. longa, 4·2–8·6 cm. lata, subcoriacea, utrinque glabra, nervis lateralibus utrinque 9–11 supra conspicuis subtus prominentibus nervis transversis utrinque conspicuis costa utrinque prominente ; petioli circiter 1·5 cm. longi, glabri. *Paniculae* ♀ et terminales et in axillis supremis, rachi tomentella, ♂ non visae. *Cupulae* patelliformes, circiter 4 mm. altae, 1·6 cm. diametro, indistincte zonatae ; pedicelli ad 8 mm. longi, medio 2·5 mm. diametro. *Glans* depresso-globosa, apiculata, 1·5 cm. alta, 1·7 cm. diametro, vix glabra.

Chiengmai, Doi Sootep, in rather open jungle, 900 m., *Kerr*, 780.

Probably a younger state with glans more elongate is represented by *Kerr*, 1312 from Doi Sootep, 660 m.

Quercus ? spicata, *Smith*—F.B.I., v. p. 609 ; For. Fl. Burma, ii. p. 486 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 47 t. 41.

Phre, 120–180 m., *Luang Vanpruk*, 164—specimen in bud only, leaves very large.

Distr. Himalayas, Burma, Assam, Malaya.

Quercus Thomsoni, *Miq.*—F.B.I., v. p. 615 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 73 t. 69a.

Chiengmai, in deciduous jungle by a stream on Doi Sootep, 480 m., *Kerr*, 1261.

Distr. Burma, Khasia.

Quercus truncata, *King*, F.B.I., v. p. 618 et Ann. Roy. Bot. Gard. Calc., ii. p. 84 t. 80.

Chiengmai, in open jungle on Doi Sootep, 900 m., *Kerr*, 1285.

To this species probably also belong *Kerr*, 1191 and 1285a, both from Doi Sootep, 900 m., the former in flower and the latter with the glans not always enclosed in the cupule. 1285a might be a natural hybrid between *Q. truncata* which it most resembles and *Q. fenestrata* which it resembles in foliage.

Distr. Assam.

Castanopsis argyrophylla, *King*, F.B.I., v. p. 622 et Ann. Roy. Bot. Gard. Calc., ii. p. 100, t. 85b.

Chiengmai, Doi Sootep, 660 m., *Kerr*, 1303 (fruit immature).

Distr. Burma.

Castanopsis ? diversifolia, *King*, F.B.I., v. p. 620 et Ann. Roy. Bot. Gard. Calc., ii. p. 96 t. 85a. *Castanea diversifolia*, Kurz, For. Fl. Burma, ii. p. 479.

Chiengmai, Doi Sootep, 990–1650 m., *Kerr*, 1283, 1769, *Hosseus*, 500.

Distr. Burma.

This species is represented in Herb. Kew by two leaf specimens of Kurz's types. The Siamese plants differ from these in their much smaller leaves, but agree with King's figure quoted above.

Castanopsis indica, *DC.*—F.B.I., v. p. 620 ; King, Ann. Roy. Bot. Gard. Calc., ii. p. 94 t. 83. *Castanea indica*, Roxb.—For. Fl. Burma, ii. p. 478.

Chiengmai, Doi Sootep, 660–1200 m., *Kerr* 1520, *Hosseus*, 420.

Distr. Himalayas, Assam, Chittagong.

Salicaceae.

Salix tetrasperma, *Roxb.*—F.B.I., v. p. 626 ; For. Fl. Burma, ii. p. 493 ; Coll. et Hemsl., Journ. Linn. Soc., xxviii. p. 129.
Doi Intanon, 800 m., *Hosseus*, 360 ; sine loco, *Kerr*, 1612a.
Distr. S.E. Asia.

ADDENDUM.

Since the publication in Bull. Herb. Boiss., iv. (1904) and v. (1905), by Dr. Williams of the List of plants known from Siam the following papers have appeared dealing with the Flora of that region :—

Hosseus, C. C., "Beiträge zur Flora des Doi Sutap," Engl. Bot. Jahrb., xl. Beibl. 93 pp. 92–99.

Hosseus, C. C., "Die Aus Siam bekannten Acanthaceen," Engl. Bot. Jahrb. xli. pp. 62–73.

Hosseus, C. C., "Vegetationsbilder aus Siam," Globus, Bd. xcvi. No. 10 and 11.

Hosseus, C. C., "Beiträge zur Flora Siams," Bot. Centralbl., Beihefte xxvii. 2, pp. 455–507.

Hosseus, C. C., "Eine neue Rafflesiaceengattung aus Siam," Engl. Bot. Jahrb., xli. pp. 55–61.

Hosseus, C. C., "Zwei interessante Neuheiten aus Siam in Kgl. Bot. Garten zu Dahlem," Notizbl. Bot. Gart. Berl., iv. pp. 314–318.

Ridley, H. N., "Botanical Expedition to Lower Siam," Gard. Chron., xlix. pp. 361–362, 383–384, 406–407.

Ridley, H. N., "The Flora of Lower Siam," Journ. Str. Br. Roy. As. Soc., 59, pp. 15–234.

Ryan and Kerr, "Dipterocarpaceae of Northern Siam," Journ. Siam. Soc., viii. pp. 1–24.

Allophylus varians, *Craib* non *Radlk.*

In describing a new *Allophylus* from Siam (*K.B.*, 1911, p. 32), the fact that there already existed an *Allophylus varians* founded by Radlkofer on *Schmiedelia varians*, Thw., was overlooked. The writer proposes for the Siamese plant the new name *Allophylus sootepensis*, Craib.

LIV.—MISCELLANEOUS NOTES.

Gogo Vine (*Entada scandens*, Benth.).—In the Board of Trade Journal, September 14th last, reference is made to samples of "soap bark," the prepared bark of the Gogo Vine, recently received from H.M. Consul at Manila, with the information that the material is suitable for the manufacture of soap and hairwashes.

From small specimens of the stem and prepared bark obtained from the Board of Trade, it has been possible to determine the

material as the produce of *Entada scandens*. This is an immense climber cosmopolitan in the tropics, and may be readily recognised by its spirally twisted stems and huge pods which are from two to four feet long, containing hard polished flat circular seeds of a chestnut colour. So long ago as May, 1855, the late Mr. T. C. Archer presented to the Museum a similarly prepared sample of the bark under the same vernacular name, with a note to the effect that it contains saponaceous properties, forms a lather with water, and is much used by Manila ladies for cleaning the hair. The following particulars as to the mode of preparing the bark and its local applications are gathered from "The Medicinal Plants of the Philippines," by T. H. Pardo de Tavera, p. 106 :—

"The use made of the mashed bark of this tree is well known throughout the Philippines. Cut in strips and beaten thoroughly between stones it is sold under the name of 'gogo' ; it is macerated in water, to which it imparts a reddish colour, and forms a substitute for soap. The Filipinos use this preparation for bathing, especially the hair, for which purpose there is no more useful or simple preparation. It cures pityriasis, and renders the hair very soft, without drying it too much as is usually the case with soap. The natives use it in treating the itch, washing the affected parts with the maceration and at the same time briskly rubbing them with the bark ; in this way they remove the crusts that shield the acari. The treatment is successful in direct proportion to the energy of rubbing. . . The maceration of gogo is emetic and purgative ; it is used in the treatment of asthma ; it is exceedingly irritating, the slightest quantity that enters the eye causing severe smarting and a slight conjunctivitis for one or two days."

The seeds, which contain saponin, are stated to be used by the Nepalese in the preparation of a hairwash. According to Watt (Dict. Econ. Prod. India), the most general use to which the seeds are applied in India is for crimping linen. The Dhobis cut one side of the seed and scoop out the kernel ; then they introduce two fingers into the cavity, and quickly stroke the damp linen forwards with its polished surface. This crimps it beautifully crossways. The seeds are made occasionally into snuff-boxes and other articles, and are often carried long distances by ocean currents.

J. M. H.

Botanical Magazine for December.—The plants figured are *Aciphylla latifolia*, Cockayne (t. 8407) ; *Rhododendron spinuliferum*, Franch. (t. 8408) ; *Symbegonia fulvo-villosa*, Warb. (t. 8409) ; *Pitcairnea tabulaeformis*, L'Hérit. (t. 8410) ; and *Prunus Sargentii*, Rehder (t. 8411).

The *Aciphylla* is a handsome Umbellifer from the subantarctic islands of New Zealand, where with two other species and with *Pleurophyllum* it constitutes a conspicuous feature in the vegetation. Its introduction to England is due to Capt. A. A. Dorrien-Smith, and the flowering specimen figured in the plate was sent from the garden of Mr. T. A. Dorrien-Smith, Tresco Abbey, Isles of Scilly.

Rhododendron spinuliferum is a Chinese species. Though originally collected by Delavay, we owe its introduction to horticulture to Mr. M. L. de Vilmorin, who raised plants from seeds sent by Ducloux in 1907. The flowers resemble those of *R. Keysii*, Nutt., but in other respects the species is more closely allied to *R. spiciferum*, Franch., and *R. scabrifolium*, Franch. It will probably be hardy only in the mildest part of our islands.

Symbegonia is an interesting genus of *Begoniaceae* in which the perianth segments of the female flower are united, while in the male flower they are free. The genus is endemic in New Guinea and includes four species, all of which have been found in Kaiser Wilhelmsland. The subject of the illustration was raised at the Royal Botanic Gardens, Glasnevin, from seed sent by Dr. Schlechter from New Guinea in 1908.

The *Pitcairnea* is a very distinct and decorative member of the genus and is an old garden plant. It was sent from Chiapas, Mexico, by Mr. Ghiesbreght to Mr. Linden, and exhibited by him about 1861. The only species which it resembles is *P. heterophylla*, Beer, in which the inflorescence is similar, but the dimorphic leaves readily distinguish it from the subject of the plate. The figure was prepared from a plant which flowered at Kew in June, 1910.

The Japanese Cherry, *Prunus Sargentii*, is most nearly related to *P. serrulata*, Lindl., but is distinguished by its few-flowered sessile or subsessile umbels and its broader and more coarsely serrated leaves. Professor Sargent presented seeds to Kew in 1893, from which the plant figured has been raised. It is one of the most beautiful of the single-flowered cherries, and in its native country the tree is said to attain a height of 80 feet ; the timber is also much used for wood carving and for the preparation of printing blocks.

Papyrus Cultivation in Egypt.—The following interesting note on Papyrus cultivation in Egypt has been received at Kew, in answer to an enquiry, from the Director-General of Agriculture, Cairo. The information, we understand, was received from a correspondent in Alexandria.

"Papyrus has been planted for commercial purposes along the canals on an estate in the Belbeis district near Cairo. So far the product is only trifling, but if the initial experiments are a success the plant will no doubt be grown on a larger scale later.

"Papyrus is easily but not very quickly propagated by means of offshoots planted one metre apart in March. It may also be raised from seed. The seed is best sown on Sphagnum moss. The seedlings take about two years to become strong plants.

"It appears that Papyrus is more sensitive to salt and to drought than the Egyptian Mat-sedge (*Cyperus alopecuroides*). The best results are obtained when the rootstocks are constantly submerged."

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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX I.—1911.

LIST OF SEEDS OF HARDY HERBACEOUS PLANTS AND OF TREES AND SHRUBS.

The following is a select list of seeds of Hardy Herbaceous Plants and of Hardy Trees and Shrubs which, for the most part, have ripened at Kew during the year 1910. These seeds are available only for exchange with Botanic Gardens, as well as with regular correspondents of Kew. No application, except from remote colonial possessions, can be entertained after the end of February.

HERBACEOUS PLANTS.

Acaena adscendens.
macrostemon.
microphylla.
myriophylla.
Novae-Zealandiae.
ovalifolia.

Acanthus Perringi.

Achillea Ageratum.
grandiflora.
lingulata.
macrophylla.

Aconitum eminens.
Kusnezoffi.
moldavicum.
uncinatum.
variegatum.
vulparia.

Actaea spicata.
— var. rubra.

Adenophora denticulata.
Potanini.
stylosa.

Adenostyles viridis.

Adesmia muricata.

Adonis vernalis.
Wabyiana.

Aethionema cappadocicum.

Agrimonia odorata.
repens.

Agropyron acutum.
tenerum.
villosum.

(18014—6*a*.) Wt 92—428. 1375. 11/10. D & S.

Agrostis alba.
elegans.
nebulosa.

Allium ciliare.
giganteum.
Kesselringii.
margaritaceum.
narcissiflorum.
neapolitanum.
odorum.
polyphyllum.
pulchellum.
siculum.
Suworowi.
Tubergeni.
Victorialis.
zebdanense.

Alonsoa albiflora.

Alstroemeria aurantiaca.

Althaea armeniaca.
ficifolia.
pallida.
pontica.
rosea.
sulphurea.

Alyssum argenteum.
creticum.
gemonense.
incanum.

Amaranthus caudatus.
Dussii.
hypochondriacus.
polygamus.
retroflexus.
speciosus.

Amethystea caerulea.

Anacyclus officinarum.
radiatus.

Anchusa italica.

Andryala integrifolia.

Anemone alpina.
baldensis.
cylindrica.
elongata.
multifida.
pratensis.
rivularis.
sylvestris.

Angelica dahurica.

Anthemis montana.
tinctoria.

Anthericum Liliago.

Antirrhinum Asarina.
Orontium.

Apera interrupta.
Spica-Venti.

Aplopappus croceus.
Parryi.

Aquilegia canadensis.
chrysantha.
glandulosa.
olympica.
truncata.

Arabis alpina.
arenosa.
pumila.
serpyllifolia.
verna.

Arctium nemorosum.

Arctotis stoechadifolia.

Arenaria cephalotes.
graminifolia.
grandiflora.
gypsophiloides.

Argemone hispida.
mexicana.
ochroleuca.
platyceras.

Armeria canescens.
majellensis.
plantaginea.

Arnica amplexicaulis.
Chamissonis.
foliosa.
longifolia.
montana.
sachalinensis.

Artemisia rupestris.

Asperula azurea.
ciliata.
galioides.

Asphodeline lutea.

Asphodelus albus.

Aster alpinus.
foliaceus.
radula.

Astilbe chinensis.
Davidii.
grandis.
rivularis.

Astragalus alopecuroides.
boeticus.
chinensis.
chlorostachys.
frigidus.
hamosus.
pentaglottis.
xiphocarpus.

Astrantia Biebersteinii.
carniolica.

Atriplex rosea.
sibirica.

Atropa Belladonna.

Baeria coronaria.

Baptisia australis.

Barbarea stricta.

Beckmannia erucaeformis.

Belamcanda punctata.

Beta Bourgaei.
trigyna.

Bidens leucantha.
tripartita.

Biscutella ciliata.
didyma.

Blumenbachia insignis.
muralis.

Bocconia microcarpa.

Boltonia asteroides.

Brachycome iberidifolia.

Brachypodium caespitosum.
japonicum.

Brassica alba.
campestris.
— var. chinensis.
Erucastrum.
rugosa.
Tourneforti.

Briza maxima.
minor.

Bromus adoënsis.
breviaristatus.
ciliatus.
commutatus.
japonicus.
macrostachys.
madritensis.
marginatus.
maximus.
polyanthus.
Porteri.
Richardsoni.
secalinus.
squarrosus.
Trinii.
unioloides.

Bulbinella Hookeri.

Buphthalmum salicifolium.

Bupleurum Candollei.
glaucum.
longifolium.
ranunculoides.
rotundifolium.
sachalinense.

Cakile maritima.

Calamagrostis confinis.

Calandrinia pilosiuscula.
umbellata.

Calceolaria mexicana.
polyrrhiza.

Callistephus hortensis.

Calystegia sepium var. dahurica.

Camassia Cusickii.
esculenta.
Leichtlinii.

Camelina sativa.

Campanula alliariaefolia.
barbata.
bononiensis.
lactiflora.
latifolia.
latiloba.
longistyla.
Raddeana.
ramosissima.
rhomboidalis.
Scheuchzeri.
spicata.
velutina.

Capsella grandiflora.
Heegeri.

Carbenia benedicta.

Carduus cernuus.
Kerneri.
tenuiflorus.

Carex arctata.
crinita.
Grayii.
pendula.

Carrichtera Vella.

Carthamus lanatus.

Carum copticum.

Celmisia holosericea.

Celsia orientalis.
pontica.

Centaurea atropurpurea.
cynaroides.
dealbata.
montana.
pulchra.
salmantica.

Cephalaria alpina.
syriaca.

Cerastium Biebersteinii.
perfoliatum.
tomentosum.

Chaerophyllum aromaticum.
nodosum.

Charieis heterophylla.

Chelidonium Franchetianum.

Chelone Lyoni.
obliqua.

Chenopodium Bonus-Henricus.
capitatum.
Quinoa.

Chorispora tenella.

Chrysanthemum anserinaefolium.
carinatum.
cinerariaefolium.
coronarium.
corymbosum.
viscosum.

Chrysogonum virginianum.

Chrysopogon Gryllus.

Cicer arietinum.
pinnatifidum.

Cimicifuga cordifolia.
foetida.
racemosa.

Cladanthus proliferus.

Cladium Mariscus.

Clarkia elegans.
pulchella.

Clematis diversifolia.
Douglasii.

Cleome violacea.

Clintonia borealis.
umbellata.

Clypeola Jouthlaspi.

Cnicus arachnoideus.
heterophyllus.
syriacus.

Cochlearia glastifolia.
saxatilis.

Codonopsis ovata.

Collinsia bartsiaefolia.
bicolor.
verna.

Collomia coccinea.
gilioides.
grandiflora.

Commelina coelestis.

Conringia orientalis.

Convolvulus farinosus.
tricolor.
undulatus.

Coreopsis auriculata.
Drummondi.
tinctoria.

Coriandrum sativum.

Coronilla elegans.

Corydalis capnoides.
cheilanthifolia.
racemosa.
rosea.
vesicaria.

Craspedia uniflora.

Crepis grandiflora.
rubra.
sibirica.

Crocus asturicus.
aureus.
biflorus.
hadriaticus.
Imperati.
longiflorus.
medius.
nudiflorus.
pulchellus.
reticulatus.
Sieberi.
speciosus.

Crucianella aegyptiaca.

Crypsis aculeata.

Cucumis metulliferus.

Cuminum Cyminum.

Cuphea Zimapani.

Cyananthus linifolius.

Cynosurus echinatus.

Cypripedium Calceolus.

Dahlia coccinea.

Datura inermis.
Tatula.

Delphinium Brunonianum.
cashmirianum.
consolida.
decorum.
dyctiocarpum.
elatum.
formosum.
Geyeri.
grandiflorum.
Maackianum.
occidentale.
speciosum.
— var. glabratum.
trolliifolium.

Demazeria sicula.

Deschampsia caespitosa

Desmodium canadense.

Deyeuxia Langsdorfii.

Dianthus arenarius.
Armeria.
caesius.
capitatus.
Caryophyllus.
deltoides.
hirtus.
neglectus.
pungens.
Requienii.
Seguieri.
squarrosus.
superbus.
sylvestris.
tener.
Waldsteini.

Dimorphotheca aurantiaca.
pluvialis.

Diplotaxis muralis.

Dipsacus asper.
atratus.
inermis.
laciniatus.
pilosus.

Dodecatheon frigidum.
Meadia.

Dorycnium herbaceum.
rectum.

Downingia elegans.

Draba aizoides.
alpina.
Athoa.
carinthiaca.
cuspidata.
frigida.
hirta.
incana.
stellata.

Dryas octopetala.

Dulichium spathaceum.

Ecballium Elaterium.

Echinodorus ranunculoides.

Echinops sphaerocephalus.

Elsholtzia cristata.

Elymus canadensis.
Caput-Medusae.

Emilia flammea.

Encelia calva.

Epilobium Dodonaei.
linnaeoides.
luteum.

Eranthis cilicica.

Erigeron alpinus.
flagellaris.
glabellus.
macranthus.
neo-mexicanus.
philadelphicus.

Erinus alpinus.

Eriophorum latifolium.

Erodium Botrys.
Manescavi.

Eruca sativa.

Eryngium agavifolium.
alpinum.
Bourgati.
bromeliaefolium
ebracteatum.
giganteum.
maritimum.
planum.
spinalba.
Zabelii.

Erysimum ochroleucum.
Perofskianum.

Eschscholzia caespitosa.
Douglasii.

Eucharidium concinnum.

Eupatorium ageratoides.
perfoliatum.

Euphorbia Kotschyana.
Wulfeni.

Fedia Cornucopiae.

Felicia fragilis.

Ferula communis var. glauca
thyrsiflora.

Festuca bromoides.
Halleri.
rigida.
tenella.

Foeniculum dulce.
virescens.

Fragaria Daltoniana.

Fritillaria acutiloba
askabadensis.
citrina.
conica.
Meleagris.

Gaillardia amblyodon.
aristata.

Galactites tomentosa.

Galega orientalis.
patula.

Galeopsis Tetrahit.

Galium thymifolium.

Gastridium australe.

Gentiana asclepiadea.
crassicaulis.
Cruciata.
decumbens.
Freyniana.
phlogifolia.
Przewalskii.
robusta.
septemfida.
straminea.
tibetica.
Walujewi.

Geranium albiflorum.
Endressi.
grandiflorum.
ibericum.
incisum.
polyanthes.
tuberosum.
Wallichianum.

Gerbera Anandria.
Bellidiastrum.
nivea.

Geum elatum.
Heldreichii.

Gilia achilleaefolia.
androsacea.
— var. alba.
capitata.
densiflora.
liniflora.
micrantha.
squarrosa.
tricolor.

Gillenia trifoliata.

Glaucium corniculatum.
flavum.
— var. fulvum.
— var. tricolor.

Gypsophila acutifolia.
elegans.
paniculata.
viscosa.

Hastingsia alba.

Hebenstretia tenuifolia.

Hedysarum esculentum.
neglectum.

Helianthemum ledifolium.
salicifolium.
Tuberaria.

Helianthus Nuttallii.
occidentalis.

Helichrysum bracteatum.
foetidum.

Heliophila amplexicaulis.
crithmifolia.

Helipterum corymbosum.
Manglesii.
roseum.

Heloniopis japonica.

Hemerocallis flava.

Herniaria glabra.
hirsuta.

Hesperis matronalis.

Heuchera Drummondi.
glabra.

Hieracium alpinum.
amplexicaule.
aurantiacum.
Auricula.
Eriophorum.
Heldreichii.
lanatum.
pannosum.
villosum.

Hilaria rigida.

Hordeum bulbosum.
crinitum.

Horminum pyrenaicum.

Hyacinthus amethystinus.
azureus.

Hydrophyllum virginicum.

Hymenophysa pubescens.

Hyoscyamus albus.

Hypecoum grandiflorum.
procumbens.

Hypericum chinense.
coris.
hirsutum.
polyphyllum.

Hypochaeris maculata.

Iberis Amara.
pinnata.

Impatiens scabrida.

Incarvillea Delavayi.

Inula britannica.
ensifolia.
racemosa.
thapsoides.

Iris bracteata.
Douglasiana.
graminea.
Hookeri.
laevigata.
longipetala.
setosa.
tectorum.

Isatis Boissieriana.
Villarsii.

Isopyrum fumarioides.

Jasione perennis.

Jasonia tuberosa.

Juncus alpinus.
Chamissonis.

Jurinea cyanoides.

Kochia scoparia.

Koeleria albescens.
phleoides.

Lactuca Bourgaei.
hastata.
macrophylla.

Lagascea mollis.

Lagurus ovatus.

Lallemantia canescens
iberica.

Lathyrus angulatus.
Aphaca.
articulatus.
Clymenum.
luteus.
maritimus.
montanus.
Nissolia.
Ochrus.
pisiformis.
polyanthus.
sativus.
setifolius.
tingitanus.
undulatus.
variegatus.

Lavatera cachemiriana.
trimestris.

Layia elegans.

Lepidium Smithii.

Leptosyne maritima.

Leuzea conifera.
longifolia.

Liatris spicata.

Ligusticum pyrenaicum.

Lilium croceum.
giganteum.
Martagon.
tenuifolium.

Limnanthes alba.
Douglasii.

Linaria anticaria.
bipartita.
dalmatica.
heterophylla.
maroccana.
melanantha.
multipunctata.
reticulata.
saxatilis.
tristis.
viscida.

Lindelofia spectabilis.

Lindheimera texana.

Linum grandiflorum.
monogynum.
nervosum.
usitatissimum.

Loasa hispida.
vulcanica.

Lobelia sessilifolia.
syphilitica.

Lotus Tetragonolobus.

Lunaria biennis.
rediviva.

Lupinus affinis.
angustifolius.
arboreus.
Douglasii.
elegans.
Hartwegii.
linifolius.
Menziesii.
micranthus.
pubescens.
reticulatus.

Luzula albida.
lutea.
nivea.

Lychnis alpina.
chalcedonica.
Coeli-rosa.
coronaria.
Flos-jovis.
Haageana.
Preslii.

Lycurus phleoides.

Lysimachia punctata.

Madia dissitiflora.
sativa.

Malcomia africana.
chia.
maritima.

Malope trifida.

Malva Duriaei.
moschata.
oxyloba.
parviflora.

Malvastrum limense.

Matthiola bicornis.
sinuata var. glabra albiflora.

Meconopsis aculeata.
cambrica.
racemosa.
Wallichii.

Melica nutans.
papilionacea.

Melilotus alba.

Mentzelia Lindleyi.

Merendera caucasica.

Mimulus cardinalis.
Lewisii.
luteus.

Mirabilis Jalapa.
Wrightiana.

Molinia coerulea.

Molopospermum cicutarium.

Monarda didyma.

Monolepis trifida.

Morina longifolia.

Muscari armeniacum.
compactum.
paradoxum.
parviflorum.
pulchellum.
Szovitzianum.

Myosuros minimus.

Nemesia strumosa.
versicolor.

Nepeta Mussini.
nuda.

Nertera depressa.

Nicotiana Langsdorffii.
paniculata.
rustica.

Ochthodium aegyptiacum.

Œnanthe pimpinelloides.
silaifolia.

Œnothera pumila.
tenella.
tenuifolia.
tetraptera.

Omphalodes linifolia.

Ononis alopecuroides.

Onopordon Acanthium.
arabicum.

Ornithopus sativus.

Ourisia macrophylla.

Paeonia anomala.
arietina.
Bakeri.
decora var. alba.
— var. Pallasii.
microcarpa.
paradoxa.
triternata.

Panicum bulbosum.
capillare.

Papaver alpinum.
apulum.
commutatum.
nudicaule.
orientale.
pavoninum.
rupifragum.
somniferum.

Peltaria alliacea.

Pentstemon acuminatus.
barbatus.
confertus.
glaber.
glaucus.
gracilis.
heterophyllus.
pubescens.
secundiflorus.
virgatus.

Phacelia congesta.
malvaefolia.
tanacetifolia.
viscida.

Phalaris brachystachys.
minor.
paradoxa.

Phleum arenarium.
asperum.

Phlomis Samia.
tuberosa.
umbrosa.

Phuopsis stylosa.

Physalis Alkekengi.
Bunyardi.
Francheti.

Physochlaina orientalis.

Physostegia virginiana.

Phyteuma canescens.
Michelii.
nigrum.
orbiculare.
Scheuchzeri.
spicatum.

Phytolacca acinosa.

Picradenia Earlei.

Plantago Candollei.
Coronopus.
maritima.
maxima.
ovata.
Psyllium.
tibetica.

Platycodon grandiflorum.
— var. Mariesii.

Platystemon californicus.

Poa violacea.

Podophyllum Emodi.

Polemonium mexicanum.
pauciflorum.

Polygonatum biflorum.
latifolium.
verticillatum.

Polygonum alpinum.
molle.
viviparum.

Polypogon littoralis.
monspeliensis.

Potentilla arguta.
argyrophylla.
crinita.
Detommasii.
fulgens.
glandulosa.
gracilis.
Herbichii.
mollis.
montenegrina.
Mooniana.
nepalensis.
recta.
rupestris.
tanacetifolia.
tridentata.
villosa.

Poterium alpinum.
canadense.

Pratia angulata.
begonifolia.

Primula denticulata.
frondosa.
japonica.
rosea.
verticillata.

Psoralea acaulis.
macrostachya.

Ramondia pyrenaica.
— var. alba.
serbica.

Ranunculus aconitifolius.
asiaticus.
brutius.
Chius.

Reseda virgata.

Rhagadiolus edulis.

Rheum Collinianum.
Rhaponticum.
Webbianum.

Rodgersia pinnata.

Roemeria hybrida.

Romulea speciosa.

Rudbeckia subtomentosa.

Rumex alpinus.
salicifolius.

Salsola Kali.

Salvia argentea.
Beckeri.
campanulata.
Columbariae.
Horminum.
japonica.
Przewalskii.
tiliaefolia.
verticillata.
virgata.
viridis.

Sambucus Ebulus.
— var. latifolius.

Sanicula europaea.

Saponaria Vaccaria.

Saussurea albescens.
Yakla.

Saxifraga cartilaginea.
cochlearis.
— var. minor.
Cotyledon.
Hostii.
lingulata.
— var. lantoscana.
Macnabiana.
mutata.
rotundifolia.
Sibthorpii.
sponhemica.
tenella.

Scabiosa caucasica.
dalmatica.
longifolia.
orientalis.
speciosa.
triniaefolia.
vestina.

Schizanthus pinnatus.

Scilla hispanica.
patula.
verna.

Scopolia sinensis.

Scorpiurus vermiculata.

Scrophularia alata.
vernalis.

Scutellaria altissima.
indica var. japonica.

Secale cereale.
dalmaticum.

Sedum altissimum.
heterodontum.
maximum.
oppositifolium.

Selinum serbicum.

Senecio Clivorum.
diversifolius.
Doria.
Doronicum.
elegans.
Ledebouri.
paludosus.
sibiricus.
stenocephalus.

Serratula coronata.
Gmelinii.

Setaria glauca.
italica.

Sidalcea candida.
Listeri.
malvaeflora.
neo-mexicana.
spicata.

Siegesbeckia orientalis.

Silene alpestris.
Armeria.
asterias.
clandestina.
colorata.
conoidea.
cretica.

Silene—*cont.*
echinata.
fimbriata.
Fortunei.
fuscata.
juvenalis.
laeta.
linicola.
longicilia.
melandrioides.
Muscipula.
noctiflora.
nocturna.
pendula.
quadrifida.
rubella.
sedoides.
Sendtneri.
squamigera.
tatarica.
tenuis.
Zawadskii.

Silphium trifoliatum.

Silybum eburneum.
Marianum.

Sisymbrium Sophia.
strictissimum.

Specularia falcata.
pentagonia.
Speculum.

Sporobolus cryptandrus.

Stachys Alopecuros.
grandiflora.

Steironema ciliatum.

Stipa Calamagrostis.
capillata.
elegans.
pennata.

Symphyandra Hofmanni.
Wanneri.

Symphytum asperrimum.

Synthyris reniformis.

Tellima grandiflora.

Thalictrum angustifolium.
aquilegifolium.
calabricum.

Thermopsis fabacea.
lanceolata.

Thlaspi perfoliatum.

Tricholepis furcata.

Tricyrtis latifolia.

Trifolium alpestre.
badium.
leucanthum.
lupinaster.
ochroleucum.
pannonicum.
rubens.
scabrum.

Trigonella caerulea.
corniculata.
cretica.
Foenum-graecum.
polycerata.

Trillium erectum.
grandiflorum.

Trollius sinensis.

Valeriana pyrenaica.
sambucifolia.

Valerianella Auricula.
coronata.
Dioscoridis.
echinata.
eriocarpa.
vesicaria.

Velezia rigida.

Veratrum californicum
nigrum.

Verbascum Blattaria.
— var. album.
Chaixii
longifolium.
phoeniceum.

Verbesina encelioides.

Veronica Bidwillii.
incana.
longifolia.
orchidea.
saxatilis.
spicata.
virginica.
— var. japonica.

Vicia bithynica.
narbonensis.
pisiformis.
unijuga.

Vincetoxicum fuscatum.

Viola rostrata.
sylvestris.

Xanthium macrocarpum.

Zygadenus bracteatus.
elegans.
muscitoxicus.

TREES AND SHRUBS.

Those marked with an asterisk were not grown at Kew.

Acanthopanax spinosum.

Alnus elliptica.
firma.
incana.
japonica.
nitida.
orientalis.
Spaethii
subcordata.
viridis.

Berberis acuminata
aetnensis.
angulosa.
aristata.
concinna.
Guimpelii
Leichtlinii.
parvifolia.
Thunbergi.
umbellata.
virescens.
vulgaris var. brachybotrys
Wallichiana
Wilsonae.

Betula fruticosa
humilis.
populifolia.
pumila.
ulmifolia.

Bruckenthalia spiculifolia

Buddleia albiflora.
variabilis.
— var. Veitchianus.

Caragana arborescens.
— var. Redowskii.
aurantiaca.

Carmichaelia australis.

Ceanothus integerrimus.
papillosus.
thyrsiflorus.
velutinus.

Celastrus articulatus.
flagellaris.
scandens.

Celtis occidentalis.

Cephalotaxus drupacea.
Fortuni.
pedunculata.

*Cistus creticus.
*crispus.
*florentinus.
laurifolius.
purpureus.
villosus.

Clematis aethusifolia var. latisecta.
campaniflora.
fusca.
globosa.
heraclaefolia.
Viticella.

Clethra alnifolia.

Colutea arborescens.
cilicica.
media.

Cornus alba.
Amomum.
candidissima.
macrophylla.
sanguinea.

Coronilla emeroides.

Cotoneaster acutifolia.
affinis.
applanata.
bacillaris.
bullata.
buxifolia.
Fontanesii.
frigida.
horizontalis.
humifusa.
integerrima.
microphylla var. glacialis.
multiflora var. granatensis.

Cotoneaster—*cont.*
pannosa.
rotundifolia.
Simonsii.
thymifolia.
tomentosa.

Crataegus Carrièrei.
coccinea.
cordata.
Crus-Galli.
*dilatata.
Dippeliana.
durobrivensis.
elliptica.
Heldreichii.
macracantha.
melanocarpa.
mexicana.
nigra.
punctata.
tanacetifolia.
tomentosa.

Cryptomeria japonica.

Cupressus Lawsoniana.
thyoides.

Cydonia Maulei.

Cytisus albus.
biflorus.
capitatus.
Heuffeli.
nigricans.
purgans.
purpureus.
sessilifolius.

Daboëcia polifolia.

Decaisnea Fargesii.

Deutzia corymbosa.
crenata.
Vilmoriniana.

Diervilla florida.
japonica.
sessilifolia.

Elaeagnus umbellata.

Eleutherococcus Henryi.

Erica arborea.
ciliaris.
scoparia.
stricta.

Escallonia pterocladon.

Euonymus latifolius.
oxyphyllus.
planipes.
yedoensis.

Exochorda Alberti.

Gaultheria procumbens.
Shallon.

Genista aethnensis.
cinerea.
germanica.
pilosa.
radiata.
sagittalis.
tinctoria.
virgata.

Helianthemum polifolium.

Hippophaë rhamnoides.

Hydrangea petiolaris.
radiata.
vestita.

Hypericum Androsaemum.
aureum.
elatum.
hircinum.
Hookerianum.
inodorum.
lysimachioides.
patulum.
— var. Henryi.
uralum.

Ilex opaca.
verticillata.

Indigofera Gerardiana.

Jasminum humile.

Juglans nigra.

Larix leptolepis.

Ledum palustre.

Leiophyllum buxifolium.

Leucothöe Catesbaei.

Leycesteria formosa.

Lonicera alpigena.
angustifolia.
caerulea.
deflexicalyx.
dioica.
involucrata.
Maackii.

Lonicera—*cont.*
nigra.
orientalis.
segreziensis.
Xylosteum.

Lupinus arboreus.

Lycium Grevilleanum.
pallidum.

Lyonia ligustrina.

Magnolia tripetala.

Myricaria germanica.

Neillia amurensis.
opulifolia.
Ramuleyi.

Olearia Haastii.

Ononis arragonensis.
fruticosa.

Pernettya mucronata.

Philadelphus acuminatus.
brachybotrys.
Gordonianus.
grandiflorus.
Lewisii.
— var. californicus.

Pieris japonica.

Potentilla davurica.
micrandra.

Ptelea trifoliata.

Pyrus Balansae.
canescens.
crataegifolia.
elaeagrifolia.
Hostii.
longipes.
nivalis.
prunifolia.
Ringo.
sikkimensis.
sinensis var. Simonii.

Rhamnus carniolica.
caroliniana.
cathartica.
crenata.
Erythroxylon.

Rhamnus—*cont.*
libanotica.
spathulifolia.
verniciflua.

Rhodotypus kerrioides.

Ribes divaricatum.
pallidum.
pubescens.
robustum.
Warszewiczii.

Rubus adenophorus.
flosculosus.
lasiostylus.
nigro-baccus.
occidentalis.
parvifolius.
phoenicolasius.
xanthocarpus.

Ruta graveolens.

Skimmia japonica.

Smilax rotundifolia.

Sophora viciifolia.

Spartium junceum.

Spiraea Aitchisoni.
arguta.
bracteata.
canescens.
Henryi.
nudiflora.

Staphylea colchica.
pinnata.
trifolia.

Symphoricarpus mollis var. ciliatus.
racemosus.

Taxus cuspidata.

Thuya orientalis.

Viburnum cotinifolium.
dentatum.
molle.
rhytidophyllum.
Sargentii.
stellulatum.

Zenobia speciosa.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX II.—1911.

NOTE.

In the preface to the *Catalogue of the Library of the Royal Botanic Gardens*, which was issued as Volume III. of the *Additional Series* of the *Kew Bulletin*, it was stated that annual lists of future additions would be published in the *Bulletin*.

The present instalment contains the additions made to the Library by gift or purchase during the year 1910, with the exception of such current periodicals and annuals as continue sets already catalogued.

Like the Catalogue, the List is printed on one side of the page to allow of its being cut up. It is probable that many persons and institutions will make the Kew Catalogue the basis of their own, and will use the lists of additions to supply printed slips for fresh titles.

(19414—6*a*.) Wt. 118—9. 1125. 4/11. D & S. A

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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX III.—1911.

NEW GARDEN PLANTS OF THE YEAR 1910.

The number of garden plants annually described in botanical and horticultural publications, both English and foreign, is now so considerable that it has been thought desirable to publish a complete list of them in the *Kew Bulletin* each year. The following list comprises all the new introductions recorded during 1910. These lists are indispensable to the maintenance of a correct nomenclature, especially in the smaller botanical establishments in correspondence with Kew, which are, as a rule, only scantily provided with horticultural periodicals. Such a list will also afford information respecting new plants under cultivation at this establishment, many of which will be distributed from it in the regular course of exchange with other botanic gardens.

The present list includes not only plants brought into cultivation for the first time during 1910, but the most noteworthy of those which have been re-introduced after being lost from cultivation. Other plants included in the list may have been in gardens for several years, but either were not described or their names had not been authenticated until recently.

In addition to species and well-marked varieties, hybrids, whether introduced or of garden origin, have been included where they have been described with formal botanical names. Mere cultural forms of well-known garden plants are omitted, for obvious reasons.

In every case the plant is cited under its published name, although some of the names are doubtfully correct. Where, however, a correction has appeared desirable, this is made.

The name of the person in whose collection the plant was first noticed or described is given where known.

An asterisk is prefixed to all those plants of which examples are in cultivation at Kew.

The publications from which this list is compiled, with the abbreviations used to indicate them, are as follows :—*Berger, Stap.*—Berger, Stapelieen und Kleinien, &c. *Berger, Suk. Euph.*—Berger,

(19475—6a.) Wt. 118—9. 1125. 4/11. D & S.

Sukkulente Euphorbien. *B. M.*—Botanical Magazine. *B. P.*—Bollettino del R. Orto Botanico di Palermo. *B. S. D. F.*—Bulletin de la Société Dendrologique de France. *B. T. O.*—Bullettino della R. Società Toscana di Orticultura. *Fedde, Repert.* — Fedde, Repertorium specierum novarum regni vegetabilis. *Gard.*—The Garden. *G. C.*—Gardeners' Chronicle. *Gfl.*—Gartenflora. *G. M.*—Gardeners' Magazine. *Jard.*—Le Jardin. *J. of H.*—Journal of Horticulture. *J. H. F.*—Journal de la Société Nationale d'Horticulture de France. *K. B.*—Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew. *Lemoine Cat.*—Lemoine, Catalogue. *M. D. G.*—Mitteilungen der Deutschen Dendrologischen Gesellschaft. *M. K.*—Monatsschrift für Kakteenkunde. *N. B.*—Notizblatt des königl. botanischen Gartens und Museums zu Berlin-Dahlem. *N. G. B. I.*—Nuovo Giornale Botanico Italiano. *O. R.*—Orchid Review. *Orchis.*—Orchis. Beilage zur Gartenflora. *R. H.*—Revue Horticole. *R. H. B.*—Revue de l'Horticulture Belge. *Sargent, T. & S.*—Sargent, Trees and Shrubs. *Späth Cat.*—L. Späth, General Nursery Catalogue. *T. H.*—La Tribune Horticole. *Veitch, N. H. P.*—J. Veitch & Sons, New Hardy Plants from Western China.

The abbreviations in the descriptions of the plants are :—*diam.*—Diameter. *ft.*—Foot or Feet. *G.*—Greenhouse. *H.*—Hardy. *H. H.*—Half-hardy. *in.*—Inches. *S.*—Stove.

***Abutilon pleniflora.** (*G. C.* 1910, xlviii. 428.) Malvaceae. G. The name proposed for the plant which is known in gardens as *A. Thompsonii* var. *flore pleno*. It is possible that it is of hybrid origin, and that *A. pictum* was one of its parents. The 3-lobed green leaves, glabrous on both sides, distinguish it from *A. Thompsonii*.

***Abutilon striatum** var. **kewense.** (*G. C.* 1910, xlviii. 428, 488.) G. In cultivation under the name of *A. Thompsonii*, and probably of hybrid origin. It differs from the other forms of *A. striatum* in having the middle lobe of the leaf less than twice as long as the undivided part, and sometimes only about equalling it, usually much less than twice as long as broad. (Kew.)

***Abutilon Thompsonii spurium.** (*G. C.* 1910, xlviii. 489.) G. This name has been given to the plant known for many years in gardens as *A. Thompsonii*. It is distinguished from the true *A. Thompsonii* (= *A. striatum*, Dicks. var. *Thompsonii*, Veitch) by having pubescent instead of glabrous leaves, and flowers with darker-coloured veins. See *G. C.* 1910, xlviii. 427.

***Acanthopanax Henryi.** (*B. M.* t. 8316.) Araliaceae. H. Shrub, 5 ft. high or more ; branches armed with flattened conical often recurved thorns. Leaves 5- rarely 3-foliolate ; petiole 1½–2 in. long ; leaflets oblanceolate or broad-lanceolate-ovate, entire or more or less toothed, the central one longest, 1½–5 in. long, 1–1¾ in. broad. Umbels of flowers and fruits resembling those of the ivy. W. China. (J. Veitch & Sons ; Kew.)

Acer Ginnala albo-variegatum. (*M. D. G.* 1910, 287, 289.) Sapindaceae. H. Leaves with large irregular pure white blotches. (Fritz Graf von Schwerin, Wendisch - Wilmersdorf, Germany.)

Acer glabrum rhodocarpum. (*M. D. G.* 1910, 287, 289.) H. Fruits shining red, remaining so till mature. In the typical form, *A. glabrum typicum*, the fruits are green. (Fritz Graf von Schwerin.)

Acer platanoides Jouinii. (*M. D. G.* 1910, 287, 289.) H. Leaves, even when young, pale green, with yellow blotches. (Simon-Louis, Plantières, Metz.)

Acer platanoides sanguineum. (*M. D. G.* 1910, 287, 289.) H. The leaves invariably become blood-red in the autumn. (Fritz Graf von Schwerin.)

Acer Pseudoplatanus rubicundum. (*M. D. G.* 1910, 288, 289.) H. A. form in which the leaves are constantly mottled with dark rose. (Walter, Grosskuchel, Prague.)

Acer rubrum magnificum. (*M. D. G.* 1910, 1, 289, col. t., f. 1.) H. Autumn leaves bright red, at first on the margins only, the red colour gradually

spreading towards the principal veins where the leaves remain green for a long time. (Fritz Graf von Schwerin.)

***Aconitum volubile tenuisectum.** (*J. H. F.* 1910, 432.) Ranunculaceae. H. Stems not twining though very slender, more than 6 ft. high, with long loose racemes of very large blue flowers. Manchuria. (Vilmorin-Andrieux & Co., Paris.)

***Actinidia Henryi.** (*Lemoine Cat.* 1910, n. 176, viii.) Ternstroemiaceae. H? Climbing. Leaves persistent, coriaceous, lanceolate, 4–6 in. long, finely toothed, bronze-red passing to a metallic-green, a rich reddish colour in autumn. Described in *K. B.* 1906, 1. Yunnan, China. (V. Lemoine & Son, Nancy.)

Adiantum scutum roseum. (*R. H. B.* 1910, 88.) Filices. S. A variety with rose-coloured fronds. (O. Bernstiel, Bornstedt, Potsdam, Germany.)

Agave carchariodonta. (*N. G. B. I.* 1907, 591; *Fedde, Repert.* viii. 399.) Amaryllidaceae. G. A new species allied to *A. Ghiesbrechtii*, but the leaves are flatter, broader in the middle, with a narrower cartilaginous border, larger lateral spines, which are more incurved and more irregular, and a much longer terminal spine. Country unknown. (Florence B. G.)

Agave Pavoliniana. (*B. T. O.* 1910, 112, f. 7.) G. Stemless. Leaves about 25, lanceolate-spathulate, 13–14 in. long, about 3¼ in broad, very convex at the base beneath, channelled at the apex above, coriaceous on the margin, spiny; lateral spines slender, irregularly reflexed; terminal spine strong, 1–1¼ in. long. Scape simple, 7 ft. long including the spike-like inflorescence. Flowers green-yellow, on pedicels about 2½ lin. long. Perianth-tube funnel-shaped, 5–6 lin. long; segments ovate-acuminate, 7½ lin. long. Country unknown. (Florence B. G.)

***Alectorurus yedoensis.** (*B. M.* t. 8336; *G. C.* 1910, xlviii. 353, f. 145.) Liliaceae. H. Perennial herb with a short thick rootstock. Leaves 6–11, tufted, falcate-ensiform, 4–20 in. long, ⅓–1 in. broad. Scape naked, 10–30 in. long, compressed, bearing a pyramidal panicle. Flowers dimorphic, some with far exserted stamens, others with stamens only equalling the perianth-segments. Perianth campanulate, pale rose, about ¼ in. long. Japan. (A. K. Bulley; Kew.)

***Alloplectus Forgetii.** (*K. B.* 1910, 383.) Gesneraceae. S. Allied to *A. Lynchei* from which it differs in having the leaves narrowly subtruncate at the base, with crisped margins, and longer villous petioles. Corolla pale yellow, spurred on the back; tube including the spur 1¼–1⅓ in. long; spur large, rounded, about 1½ lin. long; lobes spreading, transversely elliptic, 2½–3 lin. long. Peru. (F. Sander & Sons.)

Aloe spicata. (*Gft.* 1910, 316, tt. 1584-85.) Liliaceae. S. A very handsome species, with a long tail-like inflorescence, very conspicuous on account of the long-exserted yolk-coloured stamens. Plant about 4–4½ ft. high. Leaves sword-shaped, 2–2¾ ft. long, 3–3⅓ in. broad at the base, toothed. Peduncle 1¾ ft. long, bearing a crowded spike about 17 in. long. Perianth campanulate, 8 lin. long; segments white, the outer with 3 green longitudinal lines, the inner with a green midrib. Re-introduced. The Kew plant under this name is stated to be *A. eru*, Berger, var. *cornuta*, Berger. S. Africa. (Berlin-Dahlem B. G.)

Amorphophallus Schweinfurthii. (*G. C.* 1910, xlvii. 389.) Araceae. S. A species "with broad reddish-brown spathe." (Sir Trevor Lawrence.) [*A. Schweinfurthii*, N. E. Brown, a native of British and German E. Africa, is described in *Fl. Trop. Africa*, viii. 149. The leaf is about 2½ ft. across, with linear-lanceolate segments 6–8 in. long; petiole 1–1¼ ft. long. Peduncle 4–6 in. long. Spathe erect; tube 2 in. long, 1 in. across at the top, dark purple with a pale zone at the mouth; limb 4–4½ in. long, erect, very concave or somewhat hooded, dark purple.]

Androsace spinulifera. (*G. C.* 1910, xlvii. 27, f. 22.) Primulaceae. H. A robust plant wholly covered with short silvery down. Leaves oblanceolate, very variable in size, from about an inch up to 4½ in. long, ¼–½ broad near the apex, terminating in a minute spine. Scape sometimes 4 or 5 to a plant, up to 10 or 12 in. high. Umbels rounded and compact, 10–30-flowered; pedicels rather short. Flowers delicate rose-pink, with yellow eye, about ⅓ in. across. Yunnan, China. (A. K. Bulley.)

***Anemone hupehensis.** (*Lemoine Cat.* 1910, n. 176, 40.) Ranunculaceae. H. Allied to *A. japonica*. Flowers produced very early; sepals 5, mauve, more or less carmine at the base. Central China. (V. Lemoine & Son, Nancy.)

*Anemone nemorosa Allenii. (*G. C.* 1910, xlvii. 303; *Gard.* 1910, 247.) H. "A very fine variety, with large lavender-mauve blossoms." (A. Perry.)

Anguloa Cliftoni. (*K. B.* 1910, 160; *G. C.* 1910, xlvii. 77; *G. M.* 1910, 83, 107, f; *Orchis*, 1910, 119, t. 3.) Orchidaceae. S. Distinguished from all the known species of the genus by the clawed deeply 3-lobed lip, which is saccate at the base. Sepals and petals lemon-yellow, the latter with a dark lurid-purple base and many lines above, 3–4 in. long. Lip brownish-yellow, with a few brown spots on the limb of the front lobe, about 1¾ in. long; claw 5 lin. long. Colombia. (J. Talbot Clifton.)

*Anthurium Warocqueanum × crystallinum. (*B. T. O.* 1910, 8, t. 1.) Araceae. S. A garden hybrid. (R. Scuola di Pomologia, Florence.) [= *A. Pfitzeri.*]

Aralia Fargesii. (*M. D. G.* 1910, 243.) Araliaceae. H. A small tree of rapid growth, with the stem and leaves more or less prickly. Leaves pinnate; leaflets shortly stalked, broadly ovate, 4½ in. long, 2½ in. broad, sharply and unequally toothed, acuminate; midrib and veins white; petiole brown-red, stem-clasping. Central China. (C. Sprenger, Corfu.)

Aralia Henryi. (*M. D. G.* 1910, 244.) H. Plant up to 5 ft. high. Stems armed with short straight brown spines. Leaves 4- or 5-foliolate, prickly; leaflets 4 in. long, 2 in. broad, the terminal one always larger than the others, bristly hairy on both sides, faintly but sharply toothed; at the base of the first pair of leaflets are always 2 rather long-stalked leaflets and between them a long sharp spine. Central China. (C. Sprenger, Corfu.)

Arisaema pictum. (*J. H. F.* 1910, 426.) Araceae. G. A somewhat polymorphic plant. Leaves trifoliolate; leaflets almost sessile, ovate-elliptic, acuminate, 16-20 in. long, 8 in. broad in the broadest part, dark green; petiole cylindric, smooth, green, tinted with violet in the lower part, 20 in. long. Peduncle 12 in. long, green, tinted with violet. Spathe about 8 in. long, convolute in the lower half, flattened above, inflected at the apex, acuminate, striped longitudinally with broad purple-brown bands alternating with bands of silvery-white. Spadix shorter than the spathe. W. China. (M. L. de Vilmorin, Les Barres, France.)

*Aristolochia moupinensis. (*B. M.* t. 8325; *Veitch, N. H. P.* 1910, 12.) Aristolochiaceae. H. A climbing undershrub; branches slender, at first densely silky, later puberulous. Leaves cordate, 4–4½ in. long, 2¼–4 in. broad, shortly hairy above, greyish pubescent beneath; petiole 2¼ in. long. Peduncles axillary, solitary, about 3 in. long, 1-flowered. Perianth-tube pale green outside, yellow inside, 1½ in. long, abruptly curved; limb obliquely 3-lobed, 1¼ in. across, yellowish with red markings inside, greenish towards the margin. W. China. (J. Veitch & Sons.)

*Aster Falconeri. (*G. C.* 1910, xlvii. 398, f. 179.) Compositae. H. Herbaceous, about 15 in. high. Radical leaves many, oblong-lanceolate or oblanceolate, 6–8 in. long, 1½–2 in. broad, remotely denticulate; stem-leaves lanceolate, half-amplexicaul, up to 3¼ in. long and 1¼ in. broad, rather densely arranged. Flower-head solitary, 3½ in. across, surrounded by 4 leafy bracts; ray-florets many, linear, 1½ in. long, ⅛ in. broad, sky-blue, with white towards the base; disc-florets yellow. Kashmir. (W. Marshall; Kew.) [Syn. *A. diplostephioides*, Benth. var. *Falconeri*, C. B. Clarke.]

*Astilbe simplicifolia. (*G. C.* 1910, xlviii. 294, f. 122.) Saxifragaceae. H. A small species, only 9–12 in. high. Leaves in a basal tuft, ovate, irregularly lobed and incised, 3 in. long, 1½–2 in. broad; petioles 3 in. long. Inflorescence a narrow panicle produced on leafless peduncles longer than the leaves. Flowers numerous, small, star-like, pure white. Japan. (Stansfield Bros.; Barr & Sons.)

*Begonia coccinea × kewensis. (*K. B.* 1910, 321.) Begoniaceae. G. A garden hybrid. (Kew.)

*Berberis parvifolia. (*K. B.* 1910, 392.) Berberidacae. H. A low compact shrub. Leaves glaucous, oblanceolate or narrowly obovate, ¼–1 in. long, usually entire, sometimes spiny-toothed, prominently net-veined beneath, with a short spine at the apex. Spines tripartite, ½–⅝ in. long. Flowers pale yellow, in axillary clusters of 4–6; pedicels ¼ in. long. Fruit globose, of a pale translucent terra-cotta colour. W. China. (Kew.)

*Bidens dahlioides. (*G. C.* 1910, xlviii. 226, 250, f. 89; *R. H.* 1910, 475, f. 199.) Compositae. H. H. A perennial with *Dahlia*-like tubers. Stems about 2 ft. high. Leaves opposite, pinnate, with 3–7 spathulate or oblanceolate leaflets. Peduncles long

and slender. Flower-heads solitary, about 3 in. across; ray-florets usually 8, ¾ in. broad, various shades of pink purple and rose, sometimes white. Mexico. (Darmstadt B. G.; W. Artindale & Son.)

Bifrenaria bicornaria. (*G. C.* 1910, xlvii. 354.) Orchidaceae. G. Allied to *B. aurantiaca*. Spikes erect, 10–12-flowered. Flowers orange-coloured, spotted with purple. . Brazil. (F. Sander & Sons.)

Borzicactus Ventimigliae. (*B. P.* viii. 262; *B. T. O.* 1910, 82.) Cactaceae. G. Stem slender, simple, 8- or 9-ribbed. Ribs sinuate. Areoles almost hexagonal, the younger tomentose, finally glabrescent. Spines 8–10, divergent. Perianth-tube elongated; throat large, slightly oblique; segments petaloid, subbilabiate, the outer lanceolate and reflexed, the inner cuneate, red-violet. Fruit small, spherical, sparingly scaly, woolly. The genus is new and is allied to *Cleistocactus*. Ecuador. (Palermo B. G.)

Brassia Forgetiana. (*G. C.* 1910, xlviii. 434, 463, f. 209.) Orchidaceae. G. A very floriferous species belonging to the same section as *B. maculata*. Flowers whitish, with chocolate-purple markings and an orange-coloured crest to the lip. Sepals and petals long and narrow, tail-like. Lip elongated fiddel-shaped. Peru. (F. Sander & Sons.)

Brassocattlaelia Fuerstenbergii. (*Orchis*, 1910, 57, f. 10.) Orchidaceae. A garden hybrid between *Cattleya Trianae* and *Brassolaelia Gratrixiae*. (Th. Franke, Gross-Ottersleben, Magdeburg, Germany.)

Brasso-cattleya Wellesleyae. (*G. C.* 1910, xlvii. 108; *O. R.* 1910, 94; *G. M.* 1910, 123, 156, f.) G. A garden hybrid between *Cattleya Mossiae Wageneri* and *Brassavola glauca*. (F. Wellesley.)

Buddleia variabilis gigantea. (*G. C.* 1910, xlviii. 188; *Gard.* 1910, 454.) Loganiaceae. H. A variety remarkable for its very large inflorescences. (Hon. Vicary Gibbs.)

Bulbophyllum birmense. (*Orchis*, 1910, 107.) Orchidaceae. S. Allied to *B. viridiflorum* (*Cirrhopetalum viridiflorum*), but the flowers are smaller and the petals and column quite different. It is a decumbent epiphyte, with lanceolate-ligulate leaves 4½–5½ in. long and about 1 in. broad. Scape somewhat shorter than the leaves. Raceme several-flowered, about ¾ in. long. Flowers orange-yellow, very small. Burma. (Baron Max von Fuerstenberg, Hugenpoet, Essen, Germany.)

Bulbophyllum Bittnerianum. (*Orchis*, 1910, 108.) S. Pseudobulbs oblong-ovoid, 4-angled, 1¼–1½ in. long, 1-leaved. Leaves ligulate, 5½–7 in. long, ¾–1¼ in. broad. Inflorescence nodding, much shorter than the leaves; peduncle erect; spike densely many-flowered, oblong-cylindrical; bracts leafy, greenish-white, rose-dotted. Flowers somewhat larger than those of *B. Careyanum*, golden-yellow. Siam. (Baron Max von Fuerstenberg.)

Bulbophyllum exaltatum. (*G. C.* 1910, xlviii. 145; *O. R.* 1910, 279.) S. Spikes rather long. Sepals light green, dotted with brown. Lip blackish-purple, much fringed. British Guiana; Brazil. (Sir Trevor Lawrence.)

Bulbophyllum glutinosum. (*Orchis*, 1910, 108.) S. Pseudobulbs obscurely 4-angled, later 4-furrowed, 1-leaved. Leaves ligulate, 1¼–3½ in. long, up to ¾ in. broad. Scapes very slender, arising at the base of the pseudobulbs. Flowers arranged in 2 rows in short spikes, very shortly stalked, about 5 lin. across. Sepals greenish, spotted with red inside. Petals minute, white. Lip red, provided at the base with 2 horn-like acute auricles and on the upper side at the base with a slightly glandular spot. Brazil. (Baron Max von Fuerstenberg.)

Bulbophyllum nigrescens. (*K. B.* 1910, 158.) Pseudobulbs depressed-ovoid, about ⅔ in. long, 1-leaved. Leaves shortly stalked, oblong or linear-oblong, 2–4½ in. long, ½–⅔ in. broad. Scapes slender, bearing many-flowered racemes 3½–4 in. long. Sepals elliptic-oblong, 3–4 lin. long, lined and dotted with blackish-purple on a light yellow ground. Petals spathulate, 1 lin. long, blackish-purple. Lip fleshy, elliptic-oblong, 3–3½ lin. long, blackish-purple, with a green area at the base. Siam. (Trinity Coll. B. G., Dublin.)

Bulbophyllum polyblepharon. (*G. C.* 1910, xlviii. 220; *O. R.* 1910, 309, as *B. polyblepharis*.) S. Leafy as in some of the small species of *Pleurothallis*. Scapes slender, 2 in. high. Flowers solitary, dark purple. Sepals lanceolate, extended perpendicularly. Petals small. Lip densely hairy. New Guinea. (Sir Trevor Lawrence.)

Bulbophyllum trifarium. (*K. B.* 1910, 280.) S. Pseudobulbs ovoid-oblong, ½–2 in. long, 1-leaved. Leaves sessile, elliptic-oblong, about 1¾ in. long, 7½ lin. broad. Scapes arched, 5¼–6 in. long. Spikes 3–3¾ in. long, many-flowered; rhachis densely verrucose. Flowers about ⅓ in. long, arranged like the bracts in 3 rows, dull lurid-purple, with numerous minute darker dots on the sepals. Madagascar. (Sir Trevor Lawrence.)

***Callipsyche kewensis.** (*K. B.* 1910, 322.) Amaryllidaceae. G. A garden hybrid between *C. mirabilis* and *C. aurantiaca*. (Kew.)

***Campanula Beauverdiana.** (*B. M.* t. 8299.) Campanulaceae. H A glabrous or finely hairy herb, up to 2 ft. high. Stems slender, erect or ascending. Leaves below oblong-ovate or broadly ovate, 2¼ in. long, ⅔ in. broad, obtuse, crenate-serrate, petiolate; upper leaves sessile, smaller, lanceolate to linear. Flowers solitary or few, on slender pedicels up to 3 in. long. Calyx 10-ribbed, with white papillae between the ribs; lobes narrow-lanceolate, up to twice as long as the tube. Corolla blue, broad-campanulate, 1¼ in. across. Transcaucasia; N. Persia. (Kew.)

***Campanula thyrsoides × spicata.** (*K. B.* 1910, 322.) H. A garden hybrid. (Kew.)

Caralluma commutata. (*Berger, Stap.* 105, f. 23.) Asclepiadaceae. S. Stems 4–4½ in. long, 4-angled, glabrous, pale green, marbled with numerous reddish blotches and lines; angles very obtuse, with spreading conical-subulate teeth 2½–3½ lin. long. Flowers usually solitary or 2 together. Peduncles 1½–2 lin. long. Corolla nearly 1 in. across, glabrous, 5-lobed to the middle, brown inside and finely tuberculate, smooth outside; lobes triangular-ovate, shortly acuminate. Occasionally met with in European gardens as *C. Sprengeri* with which it has been confused. S. Arabia?

Catalpa speciosa albo-variegata. (*M. D. G.* 1910, 288, 289.) Bignoniaceae. H. Some of the leaves are marked with large white blotches. (Berlin-Dahlem B. G.)

***Catalpa speciosa pulverulenta.** (*G. M.* 1910, 30, 722, f.) H. A distinct variety remarkable in having the leaves freely speckled with white or cream colour. (Paul & Son, Cheshunt.)

Catalpa sutchuenensis. (*B. S. D. F.* 1907, 204; *Späth Cat.* 1910–11, n. 143, 85, as *C. sutchuensis*.) H. Leaves deltoid or elliptic-ovate, attenuate-acuminate at the apex, cuneate truncate or subcordate at the base, entire, quite glabrous even when young. Inflorescence thyrsiform, glabrous, 2–6-flowered. W. China. (L. Späth, Berlin.)

Catasetum fimbriatum aureum. (*G. C.* 1910, xlviii. 288; *G. M.* 1910, 855.) Orchidaceae. S. Flowers pale apple-green, slightly marked with rose, the whole of the centre of the lip being deep golden-yellow. (J. Gurney Fowler.)

Catasetum tenebrosum. (*G. C.* 1910, xlviii. 229.) S. Racemes straight, few-flowered; rhachis green or sordid-purple; bracts small, ovate, acute, green, 5 lin. long. Flowers very deep purple-brown, almost black, ringent, very spreading. Sepals very broadly oblong, about 1 in. long and ½ in. broad, acute, concave. Petals elliptic, about 1 in. long, slightly narrower than the sepals. Lip triangular, flat, 10 lin. long, 11 lin. broad towards the base, green, cordate at the base, with 2 small callosities near the blunt apex. Column with 2 converging bristles scarcely more than 1 lin. long. Peru. (P. Wolter, Magdeburg, Germany.)

Catasetum Tracyanum. (*O. R.* 1910, 279; *G. C.* 1910, xlviii. 107.) S. A provisional name for a distinct species with whitish-green flowers. Peru. (H. A. Tracy.)

***Catopsis penduliflora.** (*K. B.* 1910, 197.) Bromeliaceae. S. Leaves in a basal rosette, oblong-elliptic, 6 in. long, 1¼ in. broad, with membranous denticulate margins. Scape about 1½ ft. high, racemosely branched in the upper half. Flowers pendulous, shortly stalked. Sepals green, elliptic, 1½ lin. long. Petals white, oblong, 4 lin. long, 1¼ lin. broad. Peru. (F. Sander & Sons.)

Cattleya Abeliana. (*G. C.* 1910, xlviii. 253.) Orchidaceae. G. Flowers creamy-yellow, speckled with purple on the lip. Peru. (F. Sander & Sons.)

Cattleya Dietrichiana. (*G. C.* 1910, xlviii. 28.) G. A garden hybrid between *C. superba* and *C. Hardyana*. (F. Sander & Sons.) [A hybrid with the same name is included in the list of 1908, but of that the parents are reported to be *C. Schilleriana* and *C. Hardyana*.]

Cattleya labiata eximia. (*G. C.* 1910, xlviii. 319.) G. "A fine dark variety." (E. V. Low.)

Cattleya labiata virginea. (*G. C.* 1910, xlviii. 360.) G. Flower large. Sepals and petals pure white, with a slight lavender tint at the tips. Lip with a light mauve-purple front and pale yellow disc. (Stanley & Co.)

Cattleya Mendelii Dixonae. (*G. C.* 1910, xlvii. 392.) G. "A very pretty and attractive blush-pink variety." (H. Dixon.)

Cattleya Mendelii Lambeauana. (*G. C.* 1910, xlvii. 304.) G. "A pretty white flower with pale lilac front to the lip." (E. V. Low.)

Cattleya mirabilis. (*G. C.* 1910, xlvii. 303.) G. A garden hybrid between *C. Luddemanniana* and *C. Mendelii*. (F. Sander & Sons.) [A hybrid of the same name is included in the list of 1905, but the parents are stated to be *C. Warscewiczii* and *C. Patrocinii*.]

Cattleya Stuartii. (*G. C.* 1910, xlvii. 269; *O. R.* 1910, 150.) G. A garden hybrid between *C. Mendelii alba* and *C. Mossiae Reineckeana*. (Stuart Low & Co.)

Cattleya Warscewiczii alba. (*O. R.* 1910, 232, f. 14.) G. Flowers pure white, with a suffusion of greenish-yellow in the throat of the lip. (Lager & Hurrell, Summit, New Jersey, U.S.A.)

***Celastrus latifolius.** (*Veitch, N. H. P.* 1910, 12.) Celastraceae. H. A deciduous shrub with broadly ovate dark green serrate leaves 8 in. long and 6 in. broad. Flowers greenish-white, in terminal panicles. Central China. (J. Veitch & Sons.)

Cereus cinnabarinus. (*M. K.* 1910, 161.) Cactaceae. G. Erect, branched. Branches triangular. Ribs repand. Areoles small, tomentose. Spines 10–12, brown, short, slender. Flowers medium-sized, funnel-shaped; outer perianth-segments narrow, acute, green; inner 2-seriate, spathulate, obtuse, mucronate, yellow-vermilion. Stamens few; filaments short, rose; anthers scarlet. Guatemala. (W. Weingart, Georgenthal, Thuringia, Germany.)

Cereus pseudosonorensis. (*M. K.* 1910, 147, 173.) G. Stem columnar, erect, attaining a height of many feet, 2–2½ in. thick. Ribs usually 8, about 5 lin. high, crenate. Radial spines 8–14, the longest 7½ lin. long, snow-white, with brown tips; central spine 1, 1¼–1¾ in. long, brown at the base. Flowers cylindrical, 2¾ in. long, scarlet; tube nearly 2 in. long, curved; segments very short, linear-lanceolate, erect, slightly curved. Probably Mexico. Cultivated in Germany for some years under the erroneous name of *C. sonorensis*.

Cereus Regelii. (*M. K.* 1910, 33.) G. Stem columnar, erect, scarcely branched, pale green, darker between the ribs and around the areoles as if oil-blotched. Ribs 4 or 5, rounded. Furrows obtuse, soon disappearing. Radial spines 5, small, rigid; central spines 1 or 2, longer (about 7½ lin. long). Flowers cylindrical, about 9 in. long; ovary whitish, scaly and woolly; tube whitish, the lower part with a few sparingly woolly scales, the upper with many copiously woolly scales; outer segments lanceolate whitish, crimson-tipped, the inner white, sometimes with rose-shaded tips. Country unknown. (C. Knippel, Klein-Quenstedt, near Halberstadt, Germany; Haage & Schmidt, Erfurt.)

Chamaedorea Ernesti-Augusti × Schiedeana. (*B. T. O.* 1910, 207.) Palmae. S. A garden hybrid. (Rome B. G.)

Cheiranthus Arkwrightii. (*G. C.* 1910, xlvii. 410.) Cruciferae. H. A garden hybrid between *C. Allionii* and *C. alpinus*. (J. S. Arkwright.)

***Chirita rupestris.** (*B. M.* t. 8333.) Gesneraceae. S. A bushy compact annual, 1–2 ft. high. Leaves opposite, ovate, 2–3 in. long, 1–2¼ in. broad, hairy on both sides, slightly mealy beneath; petioles 2–2½ in. long. Peduncles axillary, solitary or paired, ⅓–1½ in. long, each 4–8 flowered. Calyx deeply 5-lobed; lobes linear-lanceolate, about 5 lin. long. Corolla funnel-shaped; tube white, rather longer than the calyx; limb bright blue, with a yellow blotch in front within, ⅔ in. across. Malay Peninsula. (Kew.)

***Chlorophytum comosum.** (*G. C.* 1910, xlviii. 261.) Liliaceae. S. An ornamental species with proliferous growths. Leaves radical, linear, about 2 ft. long, deep green. Inflorescence branched, about 3 ft. long. Flowers small, white, usually in fours, soon fading. Lake Albert, Central Africa; S. Africa. (J. S. Bergheim.)

*Chrysanthemum tomentosum. (*G. C.* 1910, xlviii. 210.) Compositae. H.? Allied to *C. alpinum*. It is a dwarf tufted plant, only 2 in. high when in flower. Leaves pinnatifid, densely tomentose, giving the plant a hoary appearance. Flower-heads white, ¾ in. across, borne on stems about 1 in. long. Corsica. (Kew.)

Cirrhopetalum chryseum. (*Fedde, Repert.* viii. 97.) Orchidaceae. S. Pseudobulbs ovate, 3- rarely 4-angled, small, 1-leaved. Leaves sessile, lanceolate-oblong, up to about 2 in. long. Scape filiform, up to 2½ in. long, 1-flowered. Sepals about ½ in. long, 1 lin. broad. Petals ¼ in. long, scarcely 1 lin. broad, yellow or golden, purple-lined or -dotted towards the base. Lip 4½ lin. long, scarcely ½ lin. broad. Philippines. (Erlangen B. G.)

Clematis montana vars. (*Lemoine Cat.* 1910, n. 176, 18; *Gard.* 1910, 119.) Ranunculaceae. Three varieties named *lilacina*, *perfecta*, and *undulata*, have been obtained by crossing *C. montana rubens* and *C. montana grandiflora*. The first has large bluish-lilac flowers, the second bluish-white, larger than in the variety *grandiflora*, and the third has flowers 3-3⅓ in. across, white, tinged with blue, and the sepals much undulated. (V. Lemoine & Son, Nancy.)

*Clematis nutans. (*K. B.* 1910, 392; *G. C.* 1910, xlviii. 310, f. 129; *Veitch, N. H. P.* 1910, 3, 5, f.) H. A vigorous climber, with angular pubescent stems. Leaves pinnate; leaflets 7–9, 3-lobed, coarsely toothed, pale green and pubescent especially beneath, 1½–3 in. long, scarcely as broad. Flowers in erect panicles 5–9 in. long, primrose-yellow, with a fragrance resembling that of cowslips, nodding, campanulate; sepals 4, recurved at the tips. In cultivation in France for some years past under the erroneous name of *C. Buchaniana*, which has much thicker leaves and sepals. W. China.

Clematis serratifolia. (*M. D. G.* 1910, 248.) H. Allied to *C. orientalis* from which it differs in having the leaves biternately instead of pinnately compound, the leaflets cuneate at the base, coarsely and irregularly toothed, and larger yellow, not green-yellow, flowers. The flowers are fragrant and nodding, with spreading ovate-oblong acuminate sepals ¾–1 in. long. Corea. (Arnold Arboretum, Boston, U.S.A.)

*Cocculus heterophyllus. (*Veitch, N. H. P.* 1910, 4, 5, f.) Menispermaceae. H. A deciduous climber of rapid growth. Leaves variable in shape, often broadly ovate in outline and lobed, cordate at the base, bright green. W. China. (J. Veitch & Sons.)

Codonopsis vinciflora. (*Fedde, Repert.* viii. 417.) Campanulaceae. H. Stem slender, twining. Leaves opposite or more rarely alternate, petiolate, ovate or oblong-acuminate, sinuate-dentate. Peduncle very long, 1-flowered. Flowers small for the genus. Corolla rotate, 5-partite to the base, lilac; segments elliptic, acute. Ovary almost inferior. Allied to *C. convolvulacea*. See *Acta. Horti Petrop.* xxix. 103. W. China. (St. Petersburg B. G.)

Colchicum veratrifolium. (*G. C.* 1910, xlviii. 242, f. 97.) Liliaceae. H. Similar to some of the forms of *C. speciosum*, but appears to be earlier in flowering. Leaves large and handsome. Flowers large, darker-coloured than those of *C. speciosum rubrum*. Country not recorded. (S. Arnott.)

*Columnea Oerstediana. (*B. M.* t. 8344.) Gesneraceae. S. Epiphytic undershrub or herb, with numerous simple often flexuous and pendent branches. Leaves opposite, broad-ovate or ovate-oblong, 5–8 lin. long, 3–5 lin. broad, fleshy, convex, glabrous and shining above, pale green and finely adpressed-puberulous beneath; petioles 1–1½ lin. long. Flowers axillary, solitary, erect, on peduncles about 5 lin. long. Sepals ovate, caudate-acuminate, toothed below, about 8 lin. long. Corolla scarlet, nearly 3 in. long, 2-lipped. Costa Rica. (R. H. Beddome.)

*Cornus Nuttallii. (*B. M.* t. 8311.) Cornaceae. H. Shrub or tree, reaching 50–85 (rarely 100) ft. high. Leaves usually obovate or obovate-elliptic, 2–4½ in. long, 1¾–3½ in. broad, at first hairy above but soon glabrous, hoary and softly pubescent beneath; petiole 3–8 lin. long. Bracts of the involucre usually 6, obovate, whitish and tinged with yellow or sometimes with pink, 1¾–3¼ in. long, 1–2¾ in. broad. Western N. America. First introduced about 1837. (Kew, etc.)

Cornus Slavinii. (*G. C.* 1910, xlviii. 388.) H. A natural hybrid between *C. circinata* and *C. stolonifera*. (Seneca Park, Rochester, New York.)

*Coryanthes Sanderi. (*G. C.* 1910, xlviii. 219.) Orchidaceae. S. A very large-flowered plant allied to *C. macrantha*. The fleshy lower part of the flower is yellow, spotted inside with purple, the neck-like middle having

several raised rings, and the apricot-coloured hood-like upper part is curved downwards. Country not recorded. (F. Sander & Sons.)

Corylopsis Veitchiana. (*B. M.* t. 8349.) Hamamelidaceae. H. Distinguished from *C. sinensis* by the leaves being glabrous when mature, by the distinctly exserted stamens, and by its red-brown not yellow anthers; and from *C. Henryi* by its more rounded petals and very much shorter calyx-lobes. Central China. (J. Veitch & Sons.)

Corylus heterophylla var. **sutchuenensis.** (*M. D. G.* 1910, 245.) Cupuliferae. H. This variety is characterised by having the leaves glabrous or nearly so, never truncate, but shortly attenuated at the apex, and by the campanulate-incised involucres, which scarcely exceed the nuts. Central China. (C. Sprenger, Corfu.)

***Cotoneaster acutifolia.** (*Veitch, N. H. P.* 1910, 5.) Rosaceae. H. A neat bushy deciduous shrub with dark glossy green leaves. Flowers pale rose. Berries large, dark red. This is stated to be the true *C. acutifolia*, the plant in cultivation under that name being a distinct species. China; Mongolia. (J. Veitch & Sons.)

***Cynorchis Morlandii.** (*K. B.* 1910, 283.) Orchidaceae. S. Terrestrial 1-leaved herb. Leaves sessile, broadly elliptic-ovate, 2½–5 in. long, 1¾–3 in. broad. Scapes erect, 8–12 in. high. Racemes short, subcorymbose, 5–9-flowered. Pedicels 1–1¼ in. long. Flowers medium-sized, lilac, becoming greenish-white on the disc of the lip and at the base of the other segments. Pemba Island, Mozambique District. (Kew.)

Cypripedium Chapmaniae. (*G. C.* 1910, xlviii. 220.) Orchidaceae. S. A garden hybrid between *C. Calypso* and *C. Fairrieanum*. (Mrs. N. Cookson.) [*Paphiopedilum.*]

Cypripedium Ettyi. (*G. C.* 1910, xlvii. 205.) G. A garden hybrid between *C. Godefroyae* and *C. insigne*. (J. & A. A. McBean.) [*Paphiopedilum.*]

Cypripedium Fairtisii. (*G. C.* 1910, xlviii. 288; *O. R.* 1910, 339.) S. A garden hybrid between *C. Fairrieanum* and *C. Curtisii*. (F. Lambeau, Brussels.) [*Paphiopedilum.*]

Cypripedium Haroldianum. (*G. C.* 1910, xlvii. 46.) G. A garden hybrid between *C. hirsutissimum* and *C. insigne*, Harefield Hall variety. (Mrs. N. Cookson.) [*Paphiopedilum.*]

Cypripedium insigne albidum. (*G. C.* 1910, xlvii. 45.) G. "A very distinct form, with a peculiar greenish ground colour and a good display of white in the upper part of its well-rounded dorsal sepal." (E. Rogerson.) [*Paphiopedilum.*]

Cypripedium insigne crassifolium. (*G. C.* 1910, xlvii. 14.) G. Possibly a hybrid between *C. insigne* and another species of which the name is not recorded. (D. O. Drewett.) [*Paphiopedilum.*]

Cypripedium oakwoodiense. (*G. C.* 1910, xlviii. 360.) S. A garden hybrid of unknown parentage. (Mrs. N. Cookson.)

Cypripedium Phillipsii. (*G. C.* 1910, xlvii. 46; *O. R.* 1910, 51.) S. A garden hybrid of unrecorded parentage. It has yellow flowers with chocolate markings. (H. A. Tracy.)

Cypripedium Rogersonianum. (*G. C.* 1910, xlvii. 45.) S. A garden hybrid of which one of the parents is *C. Chamberlainianum*. (E. Rogerson.) [*Paphiopedilum.*]

***Cytisus Dallimorei.** (*G. C.* 1910, xlvii, 360, 397; *Gard.* 1910, 291, f.; *K. B.* 1910, 323.) Leguminosae. H. A garden hybrid between *C. albus* and *C. scoparius* var. *Andreanus*. (Kew.)

Dendrobium Ainsworthatum. (*G. C.* 1910, xlvii. 172.) Orchidaceae. S. A garden hybrid between *D. Ainsworthii* and *D. signatum*. (Sir Trevor Lawrence.)

Dendrobium arcuatum. (*G. C.* 1910, xlvii. 108; *O. R.* 1910, 82.) S. Stems slender, leafy. Racemes 4-flowered. Flowers white, 1 in. across, with stout spurs curved forward at the tip. Java. (Sir J. Colman.)

Dendrobium Bullenianum. (*G. C.* 1910, xlviii. 107; *O. R.* 1910, 278.) S. A very distinct species. Flowers numerous, about 1 in. long, arranged in rounded heads, orange-yellow, with purple stripes. A re-introduction. Originally introduced about the year 1862. Philippines. (Sir Trevor Lawrence.)

Dendrobium Goldiei var. **Karthausianum.** (*O. R.* 1910, 205.) S. Flowers deep rose-purple, with a faint narrow

white margin to the sepals, 2¼ in. across the petals, which are obovate-orbicular in shape, somewhat recurved, 1 in. broad. Lip strongly 3-lobed, with 5 obtuse keels on the disc. (C. F. Karthaus, Potsdam, Germany.) [In *Orchis*, 1910, 115, the same plant is mentioned as *D. Karthauseanum*, a natural hybrid between *D. bigibbum* and *D. Phalaenopsis*.]

Dendrobium intermedium. (*G. C.* 1910, xlvii. 108; *O.R.* 1910, 83.) S. A garden hybrid between *D. Ainsworthii splendidissimum* and *D. nobile nobilius*. (C. L. N. Ingram.)

Dendrobium karoense. (*G. C.* 1910, xlviii. 189; *O. R.* 1910, 306.) S. A curious species resembling in habit a small *Pleurothallis* or *Stelis*. Flowers solitary in the axil of the leaf at the apex of the stem, small, white. Upper sepal narrow; lower sepals broad. Petals linear. New Guinea. (Sir Trevor Lawrence.)

Dendrobium nobile Armstrongiae. (*O. R.* 1910, 156.) S. Sepals and petals pure white, of great size and substance. Lip very dark maroon-purple. It was obtained by crossing *D. nobile Amesiae* and *D. n. virginale*. (Armstrong & Brown.)

Dendrobium ochreatum luteum. (*G. C.* 1910, xlviii. 14.) S. Flowers lemon-yellow, with the blotch on the lip of a much lighter purple than in the type. (H. A. Tracy.)

Dendrobium speciosum nitidum. (*G. C.* 1910, xlviii. 434.) S. Taller and more slender than the variety *Hillii*. Spikes numerous, large. Flowers cream-white. (Sir J. Colman.)

Dendrobium vexans. (*Orchis*, 1910, 11, 85, f.; *O. R.* 1910, 296.) S. This is the name now given to the plant erroneously identified with *Callista amabilis* and included as such in the list of 1909. It is also referred to as the type of a new genus or of a new section of *Dendrobium* under the name of *Goldschmidtia*. It is closely allied to *D. hercoglossum*. See *O. R.* 1910, 99, 242.

Dendrochilum grandiflorum. (*Fedde, Repert.* viii. 563.) Orchidaceae. S. A very large-flowered species resembling *D. magnum*, but differing in the structure of the flower. Leaves elliptic, 10 in. long, nearly 2 in. broad in the middle. Raceme densely many-flowered, about 8 in. long, bracteate at the base as in *Pholidota imbricata*. Sepals spreading, lanceolate, 5 lin. long. Petals obliquely elliptic-lanceolate, rather shorter but distinctly broader than the sepals. Lip decurved, 3-lobed from the base, 2 lin. long. Philippines? (F. Sander & Sons.)

Dendrochilum Krauseanum. (*Orchis*, 1910, 106.) S. Allied to *D. abbreviatum* but differs in the structure of the lip and in the strikingly longer column-teeth. Sepals and petals pale brownish-yellow, lanceolate or lanceolate-ligulate, about ⅛ in. long. Lip fiddle-shaped-3-lobed in outline, with a somewhat clawlike base, scarcely ⅓ in. long, having 2 brown bands and a blotch in front. Sumatra. (Baron Max von Fuerstenberg, Hugenpoet, Essen, Germany.)

Dendrochilum panduratum. (*Fedde, Repert.* viii. 562.) S. Distinguished from the other species of the section *Eu-Dendrochilum* by the lip, which is distinctly contracted in the middle and broadened in front. Flowers pale yellowish, very small, the sepals being only 1½ lin. long. Sumatra. (Berlin-Dahlem B. G., etc.)

Digitalis purpureo-ambigua. (*R.H.* 1910, 366, 421.) Scrophulariaceae. H. A garden hybrid between. *D. purpurea* var. *gloxinioides* and *D. ambigua*. (Vilmorin-Andrieux & Co., Paris.)

Disa lugens. (*G. C.* 1910, xlvii. 352; *O. R.* 1910, 184.) Orchidaceae. G. A remarkable and pretty species, producing a robust spike of about 9 cream-coloured flowers veined with purple. Lip large, deeply fringed, greenish. S. Africa. (Charlesworth & Co.)

Disa venusta. (*G. C.* 1910, xlvii. 304; *O. R.* 1910, 176.) G. A slender species with grass-like leaves. Flowers bluish, veined with red on the dorsal sepal. Lip fringed and papillose. S. Africa. (Mrs. Bischoffsheim.)

Duvalia sulcata. (*K. B.* 1910, 193.) Asclepiadaceae. G. Stems decumbent, leafless, 1–3 in. long, 4-angled, fleshy, toothed; teeth subulate, entire, 3–5 lin. long. Flowers 1-3, subfasciculate. Sepals 1½ lin. long. Corolla about 2 in. across, brown-red, with long pale rose hairs on the annulus. Arabia. (Kew.)

Echeveria gigantea. (*M. K.* 1910, 55.) Crassulaceae. G. Leaves oblanceolate, 9 in. long, 5 in. broad, shining red on the margin; petiole thick, fleshy. Flowering-stem erect, often almost 6 ft. high. Pedicels usually only 1–2½ lin. long. Corolla 6–7 lin. long. Mexico. (Darmstadt B. G.)

Echeveria setosa. (*M. K.* 1910, 55.) G. Grows in almost globose rosettes 4–5 in. across. Leaves spathulate, 1¾–2 in. long, furnished with bristle-like hairs. Flowering-stems 8 12 in. high, bearing 8–10-flowered racemes. Lowest pedicels ¾–1¼ in. long. Sepals green, linear. Petals 5–7½ lin. long, red at the base, yellow at the apex, outside shortly bristly. Mexico. (Darmstadt B. G.)

Echeveria subalpina. (*M. K.* 1910, 55.) G. Leaves in open rosettes 8–10 in. across, linear-lanceolate, 3–4 in. long, 7½–10 lin. broad, grey-green, with a reddish tapering apex. Flowering-stem simple, rarely 2-branched, with bract-like leaves. Inflorescence a 1-sided 8–20-flowered raceme; pedicels very short. Corolla ½ in. long, vermilion-red outside, yellowish inside. Mexico. (Darmstadt B. G.)

***Epacris breviflora.** (*K. B.* 1910, 216, ff. 6–11.) Epacridaceae. G. This is *E. heteronema* of *B. M.* t. 3257 and *E. dubia* var. *reflexa* of *K. B.* 1909, 228. It is distinguished from the true *E. heteronema*, Labill., in which the corolla-tube is 2 lin. long, by having a very short corolla-tube, scarcely 1 lin. long. New South Wales.

Eria clausa. (*O. R.* 1910, 71.) Orchidaceae. G. Allied to *E. vittata*, but much smaller. Racemes erect. Flowers small, whitish-green, with 3 much elevated purple keels at the base of the lip, and 7 much paler in colour on the upper half. Sikkim. (Sir Trevor Lawrence.)

Eria Goldschmidtiana. (*Orchis*, 1910, 107.) S. A new species belonging to the same group as *E. rugosa*, and well characterised by having the middle lobe of the lip provided with 7 undulate crests. Flowers whitish-yellow, with the middle lobe of the lip red; segments about ½ in. long. Formosa. (H. Goldschmidt, Essen, Germany.)

***Erica arborea** var. **alpina.** (*K. B.* 1910, 395.) Ericaceae. H. More compact than the type, with stiffer more erect plume-like branches, which throughout the winter are a cheerful vivid green. Mountains of Cuenca, Spain. (Kew.)

Eriogonum racemosum. (*G. C.* 1910, xlviii. 297, 318.) Polygonaceae. H. A little tufted plant. Leaves spathulate, clothed on the back with a dense silvery tomentum; petioles 3–4 in. long. Racemes slender, plume-like, 12-14 in. high, closely set with tufts of rosy-white flowers. Western N. America. (Sir Herbert Maxwell.)

***Erodium corsicum.** (*G. C.* 1910, xlviii. 210, f. 82.) Geraniaceae. H. One of the smallest species of this genus, growing only 1–4 in. high. Rootstock becoming woody. Leaves orbicular-ovate, softly hairy, deeply crenate. Flowers ¾ in. across, various shades of rosy pink, with veins of a deeper colour. Corsica. (Kew.)

Eryngium hybridum spectabile. (*J. of H.* 1910, lxi. 561.) Umbelliferae. H. A garden hybrid between *E. alpinum superbum* and *E. giganteum*. (E. Koehler.)

Euonymus semiexserta. (*Fedde, Repert.* viii. 54; *M. D. G.* 1910, 109, ff.) Celastraceae. H. A glabrous shrub with broadly oblong or oblong-lanceolate rather shortly acuminate crenate-serrulate leaves. It is allied to *E. Maacki*, but the arillus is bright orange and the seed, which is nearly half-exserted from the arillus, is blood-red. Japan. (L. Späth, Berlin.)

Euonymus yedoensis f. **calocarpa.** (*M. D. G.* 1910, 111.) H. Fruits a deep carmine-rose. In the typical form they are a much paler rose. (L. Späth, Berlin.)

Euphorbia. (*Berger, Sukkulente Euphorbien*, 1907, 1–135, ff. 1–33.) Euphorbiaceae. Descriptions are given of the succulent species in cultivation. Those specified below have mostly been known in gardens for many years, but under erroneous names.

***Euphorbia aggregata.** (*Berger, Suk. Euph.* 92; *Fedde, Repert.* viii. 88.) G. A dwarf freely branched shrub, usually with a short stem and numerous branches in a whorl close to the ground. Branches 8- or 9-angled, 1¼-1½ in. thick; angles separated by sharp furrows, almost straight, scarcely toothed. Areoles about 2 lin. apart. Spines rather numerous, strong, about 5 lin. long. In cultivation under various erroneous names, sometimes as *E. cereiformis*. S. Africa.

***Euphorbia Candelabrum** var. **Erythraeae.** (*Berger, Suk. Euph.* 73; *Fedde, Repert.* viii. 87.) G. Chiefly differs from the type in the number and somewhat more fleshy character of the angles of the darker green stem and branches, and in the more rounded spine-shields, which are placed nearer together. Stem 4-angled;

branches at first 3-angled, later also 4-angled. Eritrea. (La Mortola; Genoa and Palermo B. G.)

***Euphorbia enopla** var. **dentata.** (*Berger, Suk. Euph.* 95; *Fedde, Repert* viii. 89.) Stem erect, with somewhat whorled erect branches, which are 6–10 angled; angles toothed and the furrows between them somewhat zigzag. In the type the angles are almost straight or only very faintly crenate, and the furrows are also straight or slightly sinuate. Spines arising from almost every areole, about 3 lin. apart, $\frac{2}{3}$–1 in. long or more. Cultivated for many years as *E. Hystrix*, *E. enneagona* and under other erroneous names. S. Africa.

***Euphorbia Franckiana.** (*Berger, Suk. Euph.* 78, f. 19; *Fedde, Repert.* viii. 87.) G. Introduced a long time ago and cultivated under various names, sometimes as *E. virosa* or *E. tetragona*. Stem 4-angled; branches 3- or 4-angled; angles faintly undulate, furnished with a continuous narrow horny band. Pairs of spines 4–5 lin. apart, brown when young, soon becoming grey, 3 lin. long, spreading. Areoles almost in the middle of the very shallow sinus between the pairs of spines. Country unknown.

Euphorbia Morinii. (*Berger, Suk. Euph.* 98; *Fedde, Repert.* viii. 89.) G. A small plant. Stem $1\frac{1}{2}$–2 in. thick, sparingly branched, 5–8-angled; angles about 5 lin. broad and high, faintly toothed, separated by sharp furrows. Areoles small. Spines not numerous nor strong, $3\frac{1}{2}$ lin. long. Not uncommon in cultivation. S. Africa.

Euphorbia neutra. (*Berger, Suk. Euph.* 71, f. 16; *Fedde, Repert.* viii. 86.) G. In cultivation for many years either as *E. abyssinica* or *E. Royleana*, from both of which it is quite distinct. It differs from the former in having projecting grey-brown spine-shields and areoles, which in *E. abyssinica* are sunk and become black. Country unknown.

Euphorbia Pseudocactus. (*Berger, Suk. Euph.* 78; *Fedde, Repert.* viii. 87.) G. Similar to *E. Cactus*, but differs in the more slender angled branches. Stem 4- or 5-angled; branches at the base often only 3-angled, in the upper part 4-angled, jointed; sides flat, grooved, grey-green, almost covered towards the angles with yellow-green curves; angles undulate, with a continuous horny band. Spine-pairs strong, each 5–6 lin. long, about $\frac{2}{3}$ in. apart. Frequent in gardens, partly under the erroneous name of *E. lactea*. Country unknown.

Euphorbia pteroneura. (*Berger, Suk. Euph.* 29; *Fedde, Repert.* 84.) G. Usually cultivated under the erroneous name of *E. colletioides*. It is a branched shrub, about $1\frac{3}{4}$ ft. high. Stems scarcely $\frac{1}{4}$ in. thick, 5- or 6-angled. Leaves alternate, ovate-lanceolate, shortly stalked, obtuse, $\frac{3}{4}$–$1\frac{3}{4}$ in. long, 5–10 lin. broad. Probably Mexico.

***Euphorbia similis.** (*Berger, Suk. Euph.* 69, f. 15; *Fedde, Repert.* viii. 86.) G. Recently introduced under the name of *E. natalensis*, but it is distinct from *E. natalensis*, Bernh. and very closely resembles *E. abyssinica*. It is not so large and robust as that species, the sinuate ribs are not so thick, the spine-shields are borne on the tips of small recurved teeth, and the areoles are more distant and smaller. Natal?

***Euphorbia Stapfii.** (*Berger, Suk. Euph.* 59; *Fedde, Repert.* viii. 85.) G. Shrubby, scarcely $1\frac{3}{4}$ ft. high. Branches numerous, arising close-together, 4-angled, with shallow fluted sides; angles almost straight. Pairs of spines mostly about 5 lin. apart, about $2\frac{1}{2}$ lin. long, spreading, blackish. Areoles in the green tissue above the spine-shields, round, rather large. Uganda. (Kew; La Mortola.) [*E. heterochroma*, Pax.]

Fluggea microcarpa. (*M. D. G.* 1910, 246.) Euphorbiaceae. G. A pretty shrub about 6 ft. high. Leaves alternate, shortly petiolate, ovate or obovate, 1–$2\frac{1}{2}$ in. long, $\frac{1}{2}$–$1\frac{3}{4}$ in. broad, entire, glabrous. Flowers very small, unisexual, the male in dense axillary clusters, with a honey-like fragrance, the female solitary or 2 together. Fruits subglobose, $1\frac{1}{2}$–$2\frac{1}{2}$ lin. across. Tropical and subtropical regions of the Old World; Central China. (C. Sprenger, Corfu.)

***Fouquieria splendens.** (*B. M.* t. 8318.) Fouquieraceae. G. Shrub, 6–20 ft. high in the wild state, sparingly branched from the base, spiny. Leaves obovate- or oblanceolate-oblong, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, 3–5 lin. broad, those of the short branchlets fascicled and smaller, shortly petiolate; petioles and midribs usually hardening into persistent spines $\frac{1}{3}$–1 in. long. Inflorescences usually terminal, panicled, narrow, 4–6 in. long. Corolla red; tube straight, 5–8 lin. long; lobes broad-ovate, recurved, 2–$2\frac{1}{2}$ in.

long. Stamens 15, much exserted. N. Mexico & S.W. United States. (Glasnevin B. G.)

***Fritillaria imperialis** var. **chitralensis.** (*G. C.* 1910, xlvii. 171, f. 73.) Liliaceae. H. Differs from the typical form in having rich yellow flowers. Chitral. (Miss Watson.)

***Gamogyne pulchra.** (*K. B.* 1910, 197; *B. M.* t. 8330.) Araceae. S. Perennial glabrous herb. Leaves suberect, petiolate, lanceolate; blade 1¼–1½ in. long, ¾–1½ in. broad, acute, cuneate at the base Peduncles erect, about 6 in. long. Spathe almost nodding, ellipsoid, acute, convolute, opening only at the top, 1½–1¾ in. long, ¾ in. broad, bright crimson. Spadix hardly more than half as long as the spathe. Johor, Malaya. (Kew.)

***Gladiolus Colvillei albus × primulinus.** (*K. B.* 1910, 324.) Iridaceae. H. H. A garden hybrid. (Kew.)

***Gladiolus dracocephalus × primulinus.** (*K. B.* 1910, 324.) H. H. A garden hybrid. (Kew.)

Gladiolus primulinus concolor. (*Lemoine Cat.* 1910, n. 176, iv.) H. H. Flowers large, coloured almost uniformly naples-yellow, except 2 of the segments which are sulphur-yellow. (V. Lemoine & Son, Nancy.)

Gladiolus primulinus erectus. (*Lemoine Cat.* 1910, n. 176, iv.) H. H. Stems erect. Flowers large, scarcely hooded, an intense chrome-yellow, with small maroon spots. (V. Lemoine & Son, Nancy.)

Gladiolus primulinus maculatus, major & salmoneus. (*Lemoine Cat.* 1910, n. 176, 59.) H. H. Hybrids obtained by crossing *G. primulinus* with the yellowest-flowered forms of *G. Lemoinei.* (V. Lemoine & Son, Nancy.)

Goldschmidtia. See **Dendrobium vexans.**

Govenia tingens. (*O. R.* 1910, 348.) Orchidaceae. S. A terrestrial herb, 2 or 3 ft. high. Leaf-blade elliptic, about 8 in. long and 2½ in. broad. Scape 2 ft. high. Spike cylindric, about 12-flowered. Flowers much larger than in *G. superba*, yellowish, with transverse purple lines; segments lanceolate to oblong. Peru. (F. Sander & Sons.)

Gypsophila carminea (*G. C.* 1910, xlviii. 66; *J. of H.* 1910, lxi. 63.) Caryophyllaceae. H. A pretty free-flowering annual with a branching habit. Flowers ½ in. across, of a pale shade of carmine. (Dobbie & Co.)

Hemiptelea Davidii. (*M. D. G.* 1910, 275.) Urticaceae. H. A deciduous tree, armed with long spreading straight and often stout spines. Leaves shortly petiolate, oblong, usually 1–1½ in. long and ½ in. broad, acute, crenate-serrate, glabrous except the slightly pilose petioles. Flowers inconspicuous. Fruit obliquely ovate, about 2 lin. long, acute, winged. See *DC. Prodr.* xvii. 164. China; Mongolia; Corea. (St. Petersburg B. G.) [*Zelkova Davidii*, Benth & Hook. f.]

Hibiscus cupreus. (*N. G. B. I.* 1907, 600; *Fedde, Repert.* viii. 351.) Malvaceae. G. Allied to *H. Rosa-sinensis* but differs in the size and form of the flowers and leaves and in other characters. Branches coppery-purplish. Leaves lanceolate, undulate on the margin, usually entire, 2–2¾ in. long, ¾–1¼ in. broad; petiole ¾–1¼ in. long. Involucral bracts 6–8, linear, 3½ lin. long. Petals nearly 2 in. long, purple, with a deep carmine blotch at the base inside. Probably Ceylon. (Florence B. G.)

***Houlletia Sanderi.** (*G. C.* 1910, xlvii. 206; *O. R.* 1910, 118; *B. M.* t. 8346.) Orchidaceae. S. Nearest to *H. Lowiana* from which it differs in the falcate-oblong and obtuse lateral lobes of the lip. Pseudobulbs 2–2½ in. long, 1-leaved. Leaves oblong-lanceolate, about 12 in. long, 1½ in. broad. Scape erect, 10–12 in. long, 2- or 3-flowered. Flowers large, pale yellow, inverted. Sepals somewhat spreading, very concave, broad-ovate or elliptic, about 1¼ in. long. Petals nearly orbicular, about 1¼ in. long. Lip deeply 3-lobed, shorter than the petals. Peru. (F. Sander & Sons.)

***Hoya fuscomarginata.** (*K. B.* 1910, 278.) Asclepiadaceae. S. Leaves fleshy, ovate-lanceolate, 7–9 in. long, 3–3⅛ in. broad, 3-5-nerved, tawny on the margins; petiole 1–2 in. long. Umbels many-flowered. Peduncles 1½–2 in. long. Pedicels ¾ in. long. Corolla rotate, about ½ in. across, ochre-yellow or yellowish-green; lobes ovate, 2½ lin. long and broad. Origin unknown. (Glasnevin B. G.)

Huernia appendiculata. (*Berger, Stap.* 174.) Asclepiadaceae. G. A

new species which has been in cultivation for several years under the erroneous name of *H. macrocarpa*. It is very closely allied to *H. Hystrix*, but the stems are almost prostrate and have larger teeth, the peduncles are longer, the flowers somewhat larger, and of an almost white instead of sulphur-yellow ground colour. S. Africa? (La Mortola.)

Hypericum Arnoldianum. (*M. D. G.* 1910, 253.) Hypericaceae. H. A garden hybrid between *H. galioides* and *H. lobocarpum*. (Arnold Arboretum, Boston, U.S.A.)

Hypericum Dawsonianum. (*M. D. G.* 1910, 253.) H. A garden hybrid between *H. lobocarpum* and *H. prolificum*. (Arnold Arboretum.)

Hypericum nothum. (*M. D. G.* 1910, 254.) H. A garden hybrid beeween *H. densiflorum* and *H. Kalmianum*. (Arnold Arboretum.)

***Ilex Fargesii.** (*G. M.* 1910, 809.) Aquifoliaceae. H. A very distinct species remarkable in having leaves 3–4 in. long and only ¼–⅓ in. broad; they are slightly serrated, but are not at all spiny. W. China.

Impatiens Petersiana. (*R. H.* 1910, 123, 451, f. 187 & col. t.) Geraniaceae. G. Closely allied to *I. Holstii*, from which it is chiefly distinguished by the bronze-purple colour of its branches and leaves, the latter being more elongated. Flowers similar in shape and size, an intense carmine-red. Petals not emarginate. E. Trop. Africa. (Berlin-Dahlem B. G., introduced in 1902; Vilmorin-Andrieux & Co., Paris.) [*I. Walleriana*, Hook. f. var. *Petersiana*, Gilg; also in gardens as *I. Holstii* var. *Petersiana*.]

Iris acutikor. (*R. H.* 1910, 335.) Iridaceae. H. A garden hybrid between *I. acutiloba* and *I. Korolkowi*. See *G. C.* 1910, xlvii. 399. (W. R. Dykes.)

Iris albopurpurea colchesterensis. (*G. C.* 1910, xlvii. 431.) H. Differs from the type in having flowers of a rich blue with a shade of purple. It is said to be the same as a form previously introduced under the name of *coerulea*. Japan. (Wallace & Co.)

Iris Bulleyana. (*G. C.* 1910, xlvii. 418.) H. Distinguished from *I. Clarkei* by its hollow stems. Rhizome slender, widely creeping. Leaves sword-shaped, green above, glaucescent beneath. Stem nearly 1 ft. high. Spathes 2-flowered; valves green, acute. Outer perianth-segments mottled with blue-purple on a creamy ground; inner blue-purple. Yunnan, China. (A. K. Bulley.)

Iris Forrestii. (*G. C.* 1910, xlvii. 418, f. 190.) H. Allied to *I. sibirica*. Rhizome slender. Leaves linear, nearly 1 ft. long, ¼ in. broad, shining above, glaucescent beneath. Stem 1 ft. high, leafy, hollow. Spathes 1–2-flowered; valves green, acute, 2–3 in. long. Pedicels 1–1½ in. long. Perianth-segments pale yellow; outer depressed, oblong-cuneate, with a chestnut-veined claw; inner erect, oblong-lanceolate. N.W. Yunnan, China. (A. K. Bulley; W. R. Dykes.)

Iris fulvala. (*G. C.* 1910, xlvii. 431; *J. of H.* 1910, lxi. 465, f.) H. A garden hybrid between *I. fulva* and *I. hexagona Lamancei*. (W. R. Dykes.)

Iris germanica var. **parisiana.** (*R. H.* 1910, 366.) H. Stems up to 2⅓ ft. high. Flowers of average size, very fresh-coloured, white at the base, strongly striped with bright lilac on all the segments. (Vilmorin-Andrieux & Co., Paris.)

Iris iberica × macrantha. (*R. H.* 1910, 247, f. 95.) H. A garden hybrid between *I. iberica* and *I. germanica macrantha*. (F. Denis, Balaruc-les-Bains, Hérault, France.)

Iris Korolcyp. (*R. H.* 1910, 356.) H. A garden hybrid between *I. Korolkowi* and *I. cypriana*. (H. Massé, Petit-Châtenay, Vendée, France.)

Iris lisbonensis. (*G. C.* 1910, xlvii. 146.) H. Near *I. subbiflora*, differing chiefly in having a naked stem and remarkably long and broad green spathe-valves. Rhizome fleshy, compact. Leaves sword-shaped, pale yellowish-green, about 8 in. long and ¾ in. broad. Stem simple, about as long as the leaves, 1-flowered. Spathes 2¼–3 in. long. Pedicel none. Perianth-tube 1½–2 in. long, greenish, with purple stripes; segments dark red-purple, almost black-purple; beard bluish in front, then white, tipped with blue. Lisbon. (W. R. Dykes.)

***Iris Wilsonii.** (*B. M.* t. 8340.) H. Allied to *I. sibirica*, but the pedicels and herbaceous spathes are long and the flowers are mostly yellow. Rhizome short. Leaves 1–2 ft. long, 3–4 lin. broad. Stem 8–12 in. high, 2- or 1-flowered, cylindric, 1-leaved. Spathes 2¼–4 in. long, 1–2 lin. broad. Pedicels up to 5 in. long. Perianth-tube green, 4–5 lin. long; outer segments nearly

2 in. long, with an oblong- or obovate-elliptic limb, yellow, veined with purple; inner segments oblong-lanceolate, narrowed to a slender claw, ¾–1¼ in. long, 3–4 lin. broad, yellow. (J. Veitch & Sons.)

*Juniperus pachyphloea. (*M. D. G.* 1910, 139, 289.) Coniferae. H. Three juvenile forms, differing in habit and having blue or whitish-blue growths, are described under the names of **conspicua, elegantissima** and **ericoides.** (Barbier & Co., Orleans.)

Kleinia violacea. (*Berger, Stap.* 399.) Compositae. G. A succulent shrub resembling *K. Anteuphorbium* in habit. Leaves fleshy, obovate-oblong, narrowed into a short petiole. Flower-heads 3–6, in umbel-like groups, often on short lateral branches. Involucre cylindrical, of 6–8 linear bracts. Florets 11, about a half longer than the involucre, pale violet-rose. Abyssinia. (Palermo B. G.)

Lacaena bicolor alba. (*O. R.* 1910, 208.) Orchidaceae. S. Flowers of a nearly uniform yellowish-white, destitute of the usual purple markings on the lip. (Glasnevin B. G.) [Syn. *Lueddemannia Sanderiana alba.*]

Laelia chamonicensis. (*G. C.* 1910, xlvii. 366.) Orchidaceae. S. A garden hybrid between *L. purpurata* and *L. Jongheana.* (E. F. Clark.)

*Laelia Lundii. (*O. R.* 1910, 62.) S. A very small-growing plant, only about 6 in. high. Pseudobulbs small, ovoid, with one or two narrow very fleshy subterete or channelled leaves. Flowers produced on the young growth. Sepals and petals about ¾ in. long, narrow, white, suffused with lilac. Lip 3-lobed, with small acute side lobes and a broadly elliptic very undulate front lobe, covered with bright purple radiating and reticulated veins. Brazil. (F. Sander & Sons.)

Laelia lynwoodensis. (*O. R.* 1910, 83; *G. C.* 1910, xlvii. 108, as *L. Lynwoodii.*) S. A garden hybrid between *L. Jongheana* and *L. harpophylla.* (J. J. Neale.)

Laelio-cattleya ferrierensis. (*J. H. F.* 1910, 739.) Orchidaceae. G. A garden hybrid between *Cattleya Gaskelliana* and *Laelia cinnabarina.* (Domaine de Ferrières-en-Brie, Seine-et-Marne, France.)

Laelio-cattleya Firminii. (*O. R.* 1910, 22.) G. A garden hybrid between *L.-c. Ceres* and *Cattleya Dowiana aurea.* (F. Lambeau, Brussels.)

Laelio-cattleya Shepherdii. (*O. R.* 1910, 145, f. 11.) G. A garden hybrid between a yellow variety of *Laelia nigrescens* and *Cattleya Dowiana.* (E. O. Orpet, S. Lancaster, Mass., U.S.A.)

*Leptarrhena amplexifolia. (*G. C.* 1910, xlviii. 279.) Saxifragaceae. H. Grows in compact tufts, the thick fleshy rooting stems interlacing and becoming matted together. Leaves sessile, thick, leathery, oblong-ovate 2½ in. long, 1½ in. broad, evergreen, glossy green above, slightly dentate. Flowering-stems almost leafless, 12–15 in. high, bearing panicles of small white flowers. Rocky Mountains of N.W. America. (Kew.) [Syn. *L. pyrolifolia*, Ser.]

*Ligustrum Henryi. (*G. C.* 1910. xlviii. 287; *G. M.* 1910, 855; *Veitch, N.H.P.* 1910, 12.) Oleaceae. H. A very distinct species apparently of dwarf habit. Branches erect, wiry, rather densely covered with small ovate deep green leaves which have incurved margins. Central China. (J. Veitch & Sons.)

*Lissochilus Andersoni. (*K. B.* 1910, 159.) Orchidaceae. S. Scapes erect, about 1¾ ft. high, covered at the base with a few lanceolate sheaths. Racemes loose, 4–8-flowered. Sepals and petals very pale greenish or sulphur-yellow, ¾–1 in. long, the latter 5 lin. broad. Lip 3-lobed, 1 in. long, white, with 5 to 7 verrucose light purple keels on the disc. Gold Coast. (Kew.)

*Listrostachys imbricata. (*K. B.* 1910, 161.) Orchidaceae. S. Plant very small, with a very short stem. Leaves oblong, fleshy, 5–12 lin. long 2½–3 lin. broad. Scape suberect, 1¼ in. long. Spikes dense, about 7-flowered. Flowers white, small, included in the bracts. Gold Coast. (Kew.)

*Lobelia linnaeoides. (*G. C.* 1910, xlvii. 98, f. 50.) Campanulaceae. H. Similar in habit to *Pratia angulata.* Stems very slender, prostrate, purple. Leaves small, slightly fleshy, dark green above, purple beneath. Peduncles slender, erect, 1½–2 in. long, 1-flowered. Corolla white above, purplish beneath, the colour running down the midrib of the segments. New Zealand. (Edinburgh B. G.)

Lonicera Korolkowi var. **aurora.** (*Fedde, Repert.* viii; *M. D. G.* 1910,

114, f. 10 c.) Caprifoliaceae. H. Bracteoles longer than in the type. Corolla also longer (8–9 lin. long), rose-coloured. (L. Späth, Berlin; Berlin-Dahlem B. G.)

Lueddemannia Sanderiana alba. See **Lacaena bicolor alba.**

Lunaria biennis var. **corcyrensis.** (*G. C.* 1910, xlvii. 265.) Cruciferae. H. A variety with blue flowers. Corfu. (C. Sprenger, Corfu.) [*L. annua*, L. var.]

Lycaste lata. (*K. B.* 1910, 370.) Orchidaceae. S. Allied to *L. Barringtoniae*, but it has much shorter and broader sepals and petals. Pseudobulbs oblong-ellipsoid, $2\frac{3}{4}$ in. long, 2-leaved. Leaves elliptic-lanceolate, about 8 in. long, $2\frac{1}{2}$ in. broad. Scape about $1\frac{1}{4}$ in. long. Sepals and apex of the petals green, the remainder of the flower white. Upper sepal obovate-oblong, $1\frac{3}{4}$ in. long, about $\frac{3}{4}$ in. broad; lateral sepals elliptic oblong, $1\frac{1}{2}$ in. long, $\frac{3}{4}$ in. broad. Petals subspathulate, $1\frac{1}{4}$ in. long, about $\frac{3}{4}$ in. broad. Lip $1\frac{3}{4}$ in long, $7\frac{1}{2}$ lin. broad. Peru. (F. Sander & Son.)

Lycaste peruviana. (*K. B.* 1910, 160; *G. C.* 1910, xlvii. 354.) S. Pseudobulbs oblong, 6-angled, 4 in. long, $1\frac{1}{4}$–2 in. broad, 2-leaved. Leaves petiolate, elliptic-lanceolate, about 9 in. long, 3 in. broad. Scape erect, $5\frac{1}{2}$ in. long. Sepals and petals oblong-lanceolate, $1\frac{1}{2}$–2 in. long, light tawny brown, becoming paler at the base. Lip 3-lobed, 1 in. long, nearly white. The species resembles *L. Barringtoniae*, but it has longer pseudobulbs and flowers with narrower segments. Peru. (F. Sander & Sons.)

***Macaranga saccifera.** (*G. C.* 1910, xlviii. 344.) Euphorbiaceae. S. A tree or shrub; branches densely clothed with tawny-yellow hairs. Leaves deeply 3-lobed, cordate at the base, 8–10 in. long; petiole 8–10 in. long, bearing at the base a pair of curious saccate stipules. See *Engler's Jahrbücher*, xix. 93, t. 1. Congo. (Brussels B. G.)

Mahonia Aquifolium juglandifolia. (*M. D. G.* 1910, 88, 289.) Berberidaceae. H. Leaflets smaller and much thicker than those of the type, almost sessile; veins shining red. (Simon-Louis, Plantières, Metz.)

Mahonia haematocarpa. (*M. D. G.* 1910, 90.) H. Very similar to *M.* (*Berberis*) *Fremontii*, and probably only a variety of that species, having the terminal leaflet more developed than the others. Western United States. (Simon-Louis.)

Mahonia pinnata var. **Wagneri.** (*M. D. G.* 1910, 90, 290.) H. Leaves often subsessile, reddish when young; leaflets in 3–5 pairs, acutely 4- or 5-lobed each side, obscurely green and scarcely shining above, paler beneath. (Simon-Louis.)

Mahonia repens var. **macrocarpa.** (*M. D. G.* 1910, 87, 289.) H. Differs from the type in having less opaque-green leaves and thicker fruits. (Simon-Louis.)

***Malus floribunda purpurea.** (*R. H.* 1910, 539.) Rosaceae. H. A garden hybrid between *Pyrus floribunda atrosanguinea* and *P. Niedzwetzkyana*. (Barbier & Co., Orléans.) [*Pyrus.*]

Mammillaria Bödekeriana. (*M. K.* 1910, 108. f.) Cactaceae. G. Simple, globose or ovoid, $2\frac{1}{2}$ in. high, $1\frac{3}{4}$ in. across, rounded above, with a scarcely depressed glabrous summit. Tubercles loosely arranged, cylindrical, about 5 lin. long and $2\frac{1}{2}$ lin. thick, naked in the axils. Radial spines about 20, white; central 3, of which 1, the strongest, is about $\frac{1}{2}$ in. long and hooked. Flowers 1–$1\frac{1}{4}$ in. long, white, with tawny stripes. Country unknown. (F. De Laet, Contich, Belgium.)

Mammillaria bombycina. (*M. K.* 1910, 149, 191; *Gfl.* 1910, 521.) G. Globose or ellipsoid, $3\frac{1}{3}$ in. high, $2\frac{1}{2}$ in. thick, light green, slightly depressed at the summit which is covered by white wool and spines. Tubercles shortly cylindric, rounded at the apex. Axils white-woolly. Radial spines, 30–40, stiff, slender, arranged in the form of a comb, silky, the longest 5 lin. long; central spines 4, arranged crosswise, $3\frac{1}{2}$–10 lin. long, the upper two shortest, the lowest hooked, all white at the base and yellow or tawny at the tips. Flowers unknown. Mexico. (F. De Laet.)

Mammillaria cordigera. (*Gfl.* 1910, 445. f. 50; *M. K.* 1910, 191.) G. Very similar to *M. bombycina* differing chiefly by having 4-angled tubercles broader than long, and cordiform areoles, instead of cylindric tubercles longer than broad, and circular areoles. Country not recorded. (E. Heese, Gross-Lichterfelde, Berlin.)

Mammillaria Emskötteriana. (*M. K.* 1910, 139, f.) G. Irregularly tufted, globose, then shortly cylindrical, 2 in. high, $1\frac{3}{4}$ in. across, slightly

depressed at the summit where it is furnished with white woolly hairs. Tubercles conical, 5 lin. long, loosely arranged. Axils naked. Radial spines 20–25, spreading horizontally, bristle-like, white, partly with red-brown tips, up to ¾ in. long; central spines 6–8, the same size as the radial and similar in colour. Flowers tawny-yellow, about 1¼ in. long. Mexico. (R. Emskötter, Magdeburg, Germany.)

Maxillaria Johniana. (*G. C.* 1910, xlvii. 66.) Orchidaceae. G. A new species allied to *M. irrorata*. Pseudobulbs small, oblong, 1-leaved. Leaves petiolate; blades oblong, obtuse, up to 3⅓ in. long and about 1 in. broad. Scape 1-flowered. Flowers widely expanded, almost 1¾ in. across, white, with the upper half of the sepals and petals deep lilac, and the oblong lip yellowish, with a broad marginal band of lilac. Andes of Peru. (K. W. John, Andernach-on-the Rhine.)

Megaclinium fuscum. (*G. C.* 1910, xlvii. 237; *O. R.* 1910, 147.) Orchidaceae. S. Inflorescence with a flattened dark purple rhachis, spotted with white. Flowers brownish-purple, arranged in a row on each side of the rhachis. Country not recorded. (Sir Trevor Lawrence.)

***Megaclinium lutescens.** *K. B.* 1910, 158.) S. Pseudobulbs ovoid-oblong, tetragonal, about 8 lin. long, 2-leaved. Leaves sessile, narrow-oblong, ¾–1½ in. long, 2½–3½ lin. broad. Scapes 1¼–1¾ in. long; rhachis very narrow, ¾–1¼ in. long. Flowers nearly sessile, honey-yellow, scarcely ¼ in. long. Distinguished from *M. minutum* by the much narrower rhachis and the acuminate dorsal sepal. Gold Coast. (Kew.)

Melastoma normale. (*R. H.* 1910, 332, col. t.) Melastomaceae. G. Plant about 5 ft. high, with brownish-grey young branches bearing long hairs. Leaves petiolate, ovate-oblong, 5–6 in. long, ¾–2 in. broad in the middle, 5-nerved, clothed above with greyish scattered hairs, with a yellowish felt beneath. Flowers several together at the ends of the branches, destitute of bracts. Calyx covered with a tawny-yellow pubescence; lobes linear-subulate. Petals ovate, a beautiful lilac-rose, 1 in. long. India, Malaya and Polynesia. (Paris B. G.) [According to Fl. Brit. Ind., *M. napalense*, Lodd. Bot. Cab. t. 707, is a synonym of *M. normale*.]

***Meliosma Veitchiorum.** (*K. B.* 1910, 173, f.; *G. M.* 1910, 917.) Sabiaceae. H. A deciduous tree 40–50 ft. high, with very thick young shoots covered with a rust-coloured pubescence. Leaves pinnate, 2–3 ft. long; leaflets 9 or 11, ovate or oblong, pointed, the largest 6–8 in. long, 3–3½ in. broad. Inflorescence an erect terminal panicle or cluster of panicles, pyramidal in outline, up to 18 in. high. Flowers white, ⅛ in. across. Central China. (J. Veitch & Sons.)

***Mertensia echioides var. elongata.** (*G. C.* 1910, xlvii. 391, f. 176, the figure as *M. echioides lanceolata*; *G. M.* 1910, 468.) Boraginaceae. H. Resembles *M. primuloides* in habit. Stems 9–12 in. high. Flowers Gentian-blue. (Bakers'.) [This is probably *M. elongata*, Benth., a Kashmir plant, which, in *Fl. Brit. Ind.* iv. 170, is treated as a distinct species.]

Metternichia Wercklei. (*R. H.* 1910, 149.) Solanaceae. G. A beautiful evergreen sarmentose shrub, sometimes growing naturally as an epiphyte, with an edible tuberous rootstock. Leaves ovate, entire, coriaceous. Flowers 8–25 together, in terminal corymbs up to 7 in. long. Corolla funnel-shaped, resembling in form that of the *Gloxinia*, 3 in. long, 2 in. across the 5-lobed limb, white, passing to sulphur-yellow, fragrant. Costa Rica. (Paris B. G.)

Micromeles caloneura. (*K. B.* 1910, 192; *B. M.* t. 8335.) Rosaceae. H. Tree or shrub. Leaves elliptic- or obovate-oblong, 2½–3½ in. long, 1¼–1¾ in. broad, twice serrate-crenate, glabrous above, sparingly hairy on the nerves beneath; petioles ½ in. long. Flowers white, ¼ in. across, in rather crowded corymbs borne on short twigs. Stamens about 20; anthers violet-purple. Fruit globose-pyriform, brown, with white dots, 4–5 lin. long. W. China. (J. Veitch & Sons.)

Miltoglossum Vuylstekei. See **Odontonia Vuylstekei.**

Miltonia Robsonae. (*G. C.* 1910, xlvii. 353.) Orchidaceae. S. A garden hybrid between *M. Roezlii* and *M. vexillaria* "Queen Alexandra." (J. Robson.)

Miltonia Rogersonii. (*G. C.* 1910, xlviii. 189.) S. "Like a large pale *M. vexillaria*." (Trustees of the late E. Rogerson.)

Miltonia vexillaria Laurae. (*G. C.* 1910, xlvii. 300; *O. R.* 1910, 171.) S. Flowers very dark-coloured, almost purple. (Charlesworth & Co.)

Miltonia Warscewiczii leucochila. (*G. C.* 1910, xlviii. 476.) S. Sepals and petals pale purple, white and crimped at the margins. Lip large, the lower half ruby-purple, semi-transparent in the middle. (Charlesworth & Co.)

Montanoa grandiflora. (*R. H.* 1910, 174, ff. 66–68.) Compositae. G. Taller and more branched than *M. bipinnatifida*, the leaves larger, broadly lobed, the blade extending to the base of the petiole in the form of wings. Flower-heads 2–2½ in. across, with 8–10 (not 5 or 6 as in *M. bipinnatifida*) linear-lanceolate white ray-florets. Mexico. (R. Roland-Gosselin, Villefranche-sur-Mer, France.)

Montbretia imperialis. (*J. H. F.* 1910, 498.) Iridaceae. H. A garden form remarkable for its very large flowers, which are 3⅓–3¾ in. across, orange-red, very lightly spotted with brown on the claws of the segments. (Vilmorin-Andrieux & Co., Paris.)

Mormodes Wolteriana. (*G. C.* 1910, xlviii. 229.) Orchidaceae. S. Somewhat similar to *M. buccinator*. Raceme up to 10-flowered, 5 in. long; rhachis green; bracts small, triangular, about 5 lin. long. Sepals and petals spreading, ovate-lanceolate, 1⅓–1½ in. long, 4–5 lin. broad, acuminate, revolute along the margin, orange-brown, paler outside. Lip rhombic, with a cuneate or shortly-clawed base, 3-lobed, of the lower flowers up to 1¼ in. long, of the upper ¾ in. long, orange-brown, hairy inside. Peru. (P. Wolter, Magdeburg, Germany.)

Narcissus Fosteri. (*G. C.* 1910, xlvii. 342, f. 146.) Amaryllidaceae. H. A garden hybrid between *N. Bulbocodium* var. *citrinum* and *N. triandrum*. (Lady Foster; Cambridge B. G.)

***Neoglaziovia concolor.** (*B. M.* t. 8348.) Bromeliaceae. S. A shortly-stemmed herb resembling a *Dyckia*. Leaves 5–8, linear, 1½–2 ft. long, 1 in. broad, white-lepidote, prickly on the edges with subulate or sometimes incurved spines 2 lin. long. Raceme terminal, shorter than the leaves; pedicels less than ¼ in. long. Calyx scarlet, ovoid, more than ½ in. long; lobes short, blunt. Petals violet, oblong-spathulate, ¾ in. long, with lacerated basal scales 1 lin. long. Brazil. (Kew.)

***Neoglaziovia variegata.** (*B. M.* sub t. 8348.) S. Differs from *N. concolor* in being taller, and the leaves, instead of being uniformly white-lepidote as is that species, are glabrous or only very minutely lepidote. Brazil. (Kew.)

Neolauchea pulchella. (*O. R.* 1910, 360.) Orchidaceae. S. Plant only about 3 in. high, with a creeping rhizome and ovoid pseudobulbs about 3 lin. long, each bearing a single slender terete leaf. Scapes 1-flowered, about as long as the leaves. Flowers 5 lin. long, bright purple. Sepals and petals subconnivent. Lip erect, with 2 sharply reflexed angles at the base. Probably Tropical America. (Glasnevin B. G. Originally introduced into Austria about the year 1897.)

***Nepenthes nobilis.** (*G. C.* 1910, xlviii. 319, 337, f. 141; *G. M.* 1910, 870.) Nepenthaceae. S. A garden hybrid between *N. sanguinea* and *N. Curtisii superba*. (J. Veitch & Sons.)

Nephrolepis Neuberti. (*R. H.* 1910, 442.) Filices. S. A sport from *N. exaltata* var. *Whitmani*, distinguished by its dwarfer habit and extremely fine divisions of the fronds. (Neubert, Wandsbek, Germany.)

***Notylia trisepala.** (*B. M.* t. 8306.) Orchidaceae. S. An epiphyte, with oblong pseudobulbs scarcely ½ in. long, each bearing 1 leaf. Leaves oblong, 1¾–3 in. long, ¾–1¼ in. broad. Scape pendulous, 3–7 in. long, with a long many-flowered raceme. Flowers pale green, scarcely ¼ in. long. Sepals and petals ovate-oblong or oblong. Lip suberect, ovate-scoopshaped. First introduced about 1850. Mexico. (W. E. Ledger.)

Nymphaea Rehneltiana. (*Gfl.* 1910, 154, f. 11.) Nymphaeaceae. S. A very free-flowering new species. Tubers obovate, medium-sized. Leaves almost round, slightly sinuate on the margin, darker green above, green somewhat tinged with violet beneath. Flowers violet-scented. Sepals 4, broad and obtuse. Petals about 14, obvate or spathulate, pale blue, darker towards the tips and on the back. Northern Territory of S. Australia. (F. Henkel, Darmstadt, Germany.)

Octomeria decipiens. (*Orchis*, 1910, 58.) Orchidaceae. S. Leaves semi-terete, up to 4½ in. long, ¾–1 in. broad,

3-nerved. Flowers fasciculate, distinctly shortly stalked, pale yellow. Upper sepal free; lateral sepals slightly connate at the base; all ovate, about 3 lin. long and 1¼ lin. broad. Petals ovate-lanceolate, the same size as the sepals. Lip triangular-elongated-ovate, 2 lin. long, 1 lin. broad. Brazil. (Berlin-Dahlem B. G.)

Odontioda beechense. (*O. R.* 1910, 152.) Orchidaceae. G. A garden hybrid between *Cochlioda Noetzliana* and *Odontoglossum Rolfeae.* (H. J. Craven.)

Odontioda Corneyana. (*O. R.* 1910, 123.) G. A garden hybrid between *Cochlioda Noetzliana* and *Odontoglossum Lambeauianum.* (H. J. Craven.)

Odontioda cuprea. (*G. C.* 1910, xlvii. 142; *O. R.* 1910, 86, 94.) G. A garden hybrid between *Cochlioda Noetzliana* and *Odontoglossum cristatum.* (F. Sander & Sons.)

Odontioda ignea. (*J. H. F.* 1910, 473.) G. A garden hybrid between *Odontoglossum Lindeni* and *Cochlioda Noetzliana.* (H. Graire, Amiens, France.)

Odontioda Leeana. (*O. R.* 1910, 153.) G. A garden hybrid between *Cochlioda Noetzliana* and *Odontoglossum spectabile.* (W. R. Lee.)

Odontioda maculatissima. (*T. H.* 1910, 141.) G. A garden hybrid between *Odontoglossum amoenum* and *Cochlioda sanguinea.* (L. Linden, Brussels.)

Odontioda nevense. (*G. C.* 1910, xlvii. 431; *O. R.* 1910, 210.) G. A garden hybrid between *Odontoglossum nevadense* and *Cochlioda Noetzliana.* (W. Thompson.)

Odontioda Seymourii. (*G. C.* 1910, xlvii. 142; *O. R.* 1910, 86.) G. A garden hybrid between *Odontoglossum Uroskinneri* and *Cochlioda vulcanica.* (R. G. Thwaites.)

Odontioda speciosa. (*R. H. B.* 1910, 358.) G. A garden hybrid. Parents not recorded. (Duchesne & Lanthoine, Watermael, Belgium.)

Odontioda Wilsonii. (*G. C.* 1910, xlviii. 220, 253; *O. R.* 1910, 312.) G. A garden hybrid between *Cochlioda vulcanica* and *Odontoglossum Pescatorei.* (R. G. Thwaites; W. Bull & Sons.)

Odontoglossum Blackii. (*G. C.* 1910, xlvii. 173; *O. R.* 1910, 115.) Orchidaceae. G. A garden hybrid between *O. Rossii* and *O. Pescatorei.* (R. G. Thwaites.)

Odontoglossum Cravenianum. (*G. C.* 1910, xlvii. 173; *G. M.* 1910, 211, f.; *O. R.* 1910, 113, f. 9.) G. A garden hybrid between *O. cirrhosum* and *O. ramosissimum.* (Charlesworth & Co.)

Odontoglossum crispum Cravenianum. (*O. R.* 1910, 123.) G. A fine flower with large blotches of chocolate-red. (H. J. Craven.)

Odontoglossum crispum Evansianum. (*G. C.* 1910, xlvii. 353.) G. Segments of the flower-almost covered with deep claret-coloured blotches. (J. Robson.)

Odontoglossum crispum Julliettiae. (*R. H.* 1910, 226.) G. Flower copper-red, perfect in form. (F. Lambeau, Brussels.)

Odontoglossum crispum Newtonii. (*G. C.* 1910, xlvii. 269.) G. Flowers large, with cinnamon-brown blotches. (H. S. Goodson.)

Odontoglossum crispum trilabellum. (*O. R.* 1910, 61.) G. Sepals fringed and similar in shape to the petals, the adjacent halves of the lateral ones having yellow crests and dark blotches like those of the lip. (O. O. Wrigley.)

Odontoglossum Dixonae. (*G. C.* 1910, xlviii. 288; *O. R.* 1910, 340.) G. A garden hybrid between *O. Edwardi* and *O. luteopurpureum hystrix.* (H. Dixon.)

Odontoglossum keighleyense. (*O. R.* 1910, 152.) G. A garden hybrid between *O. amabile* and *O. crispum.* (H. J. Craven.)

Odontoglossum regale. (*G. C.* 1910, xlvii. 237.) G. A garden hybrid between *O. ardentissimum* and *O. Lawrenceanum.* (F. Sander & Sons.)

Odontoglossum Rossianae. (*G. C.* 1910, xlvii. 173.) G. A garden hybrid between *O. Rossii* and *O. Adrianae.* (F. Sander & Sons.)

Odontoglossum splendens. (*G. C.* 1910, xlvii. 143; *O. R.* 1910, 86; *G. M.* 1910, 191, 193, f.) G. A garden hybrid between *O. eximium* and *O. Wilckeanum.* (F. Sander & Sons.)

Odontoglossum Thwaitesii. (*G. C.* 1910, xlvii. 304.) G. A garden hybrid between *O. ardentissimum* and *O. Harryanum*. (R. G. Thwaites.)

Odontonia Lambeauiana. (*O. R.* 1910, 210.) Orchidaceae. G. A garden hybrid between *Miltonia Warscewiczii* and *Odontoglossum Lambeauianum*. (Peeters & Sons, Brussels.)

Odontonia Vuylstekei. (*O. R.* 1910, 209.) G. A garden hybrid between *Miltonia vexillaria gigantea* and *Odontoglossum amabile*. (Ch. Vuylsteke, Loochristi, Ghent.) [Syn. *Miltoglossum Vuylstekei*; T. H. 1910, 241, t. 204.]

Oncidioda Charlesworthii. (*G. C.* 1910, xlviii. 188; *O. R.* 1910, 318.) Orchidaceae. G. A garden hybrid between *Cochlioda Noetzliana* and *Oncidium incurvum*. (Charlesworth & Co.)

***Oncidium Ballii.** (*K. B.* 1910, 371.) Orchidaceae. G. Resembles *O. murinum* in habit, but it has larger bracts and an oblong obtuse lip with a broad callus. Pseudobulbs ovate, compressed, 2–2½ in. long, 1-leaved at the apex, 2-leaved at the base. Leaves oblong, 4–6½ in. long, 1–1¾ in. broad. Scape about 12 in. long. Panicle straight, narrow, dense, about 7 in. long, many-flowered. Flowers small, bright yellow, with brown markings on the lower half of the sepals and petals, and the base of the lip darker shining brown. Country unknown. (G. Shorland Ball.)

Oncidium Beyrodtianum. (*Fedde, Repert.* viii. 572.) G. Allied to *O. varicosum* and *O. flexuosum*, but easily distinguished from both by the crest of the lip, which is simple, quadrate-rounded, and scarcely warty above the base. Inflorescence paniculate, 16–20 in. long. Flowers golden-yellow, similar to those of *O. flexuosum*. Brazil. (O. Beyrodt, Marienfelde, Berlin.)

Oncidium Mantinii Lowii. (*G. C.* 1910, xlviii. 145.) G. Flowers unusually large, a beautiful citron-yellow, with obscure olive-brown markings on the sepals, petals and front of the lip. (E. V. Low.)

Oncidium Sanderae. (*G. C.* 1910, xlviii. 67; *O. R.* 1910, 351; *G. M.* 1910, 593.) G. Most nearly allied to *O. Papilio*. It differs in the much crisped lighter-coloured lateral sepals and lip, and in the column wings being broken up into more numerous filiform capitate appendages. Lateral sepals clear bright yellow, with very numerous brown bars and spots. Front lobe of the lip similar in colour, with a broad band of brown spots round the margin. Peru. (F. Sander & Sons.)

Osmunda palustris crispato-congesta. (*G. C.* 1910, xlvii. 303; *Gard.* 1910, 247.) Filices. A dwarf form with crested bronze-green fronds. (H. B. May & Sons.)

***Ourisia Cockayniana.** (*G. C.* 1910, xlvii. 314.) Scrophulariaceae. H. Grows naturally in large patches, with its creeping and rooting stems matted together. Leaves small, ovate, bright green above, purplish beneath; petioles short, broad, ciliate. Flowering-stems erect, 3–6 in. high, bearing several whorls of 3 sessile leaves. Flowers produced in the upper whorls, on pedicels 1½ in. long. Corolla pure white, with a few yellow hairs in the throat, nearly 1 in. across. New Zealand. (T. A. Dorrien Smith.)

***Palisota Albertii.** (*G. C.* 1910, xlviii. 423.) Commelinaceae. S. Nearly stemless. Leaves 1½–3 ft. long, 4–10 in. broad, broadest at the apex, abruptly and shortly acuminate, long-attenuated at the base, not variegated, very dark green above, grey-pubescent or silvery-white beneath; petiole thick, 4–10 in. long, broadly channelled, pilose but destitute of marginal hairs. Belgian Congo. (Brussels B. G.?)

***Palisota Elizabethae.** (*G. C.* 1910, xlviii. 423, f. 176.) S. Resembles *P. Albertii*, but it is not so robust, the leaves are variegated, and the petioles are furnished with marginal hairs. The long-acuminate leaves are 2–3 ft. long and 4–10 in. broad, and have a greenish-yellow band running down the centre. Belgian Congo. (Brussels B. G.?)

Paliurus orientalis. (*M. D. G.* 1910, 246.) Rhamnaceae. H.? A small tree; shoots of the year olive-green in autumn and winter; spines nearly as long as the petioles, deep black, directed straight upwards or occasionally slightly curved. Leaves rather long-stalked, 3 in. long, 2 in. broad, shining green on both sides, equally and obtusely toothed, prominently 3-nerved. The fruits are larger and thicker than those of *P. australis*. Central China. (C. Sprenger, Corfu.) [Apparently not the true *P. orientalis*, Hemsl., which is spineless.]

Papaver Schinzianum. (*Fedde, Repert.* viii. 573.) Papaveraceae. H. Probably a garden hybrid between

P. rupifragum and a species allied to *P. lateritium*. It has been cultivated as *P. Heldreichii*. Flowers brick-red. Petals suborbicular-obovate, 1–1¼ in. long. Capsule obovoid-club-shaped or more club-shaped. (Zurich B. G.)

Paphiopedilum Charlesworthii var. **Karthausii.** (*O. R.* 1910, 337, f. 21.) Orchidaceae. S. Flowers very large, nearly circular in outline. Dorsal sepal 3⅛ in. across, very richly coloured. Petals broad and short. (C. F. Karthaus, Potsdam, Berlin.)

***Paulownia Duclouxii.** (*B. S. D. F.* 1908, 162; *M. D. G.* 1910, 246.) Scrophulariaceae. H.? A large tree. Leaves roundish, about 18 in. across, acutely 4- or 5-lobed, somewhat cordate at the base, toothed, downy beneath; principal veins reddish; petioles 16 in. long, densely and softly hairy, brown-red at the base. Inflorescence more villous than in *P. Fortunei*. Corolla white, slightly rose-coloured inside. Yunnan, China. (C. Sprenger, Corfu; O. Dode, Paris.)

***Pectinaria asperiflora.** (*G. C.* 1910, xlviii. 174.) Asclepiadaceae. G. Plant consisting of a cluster of globose oblong or cylindric leafless stems, ½–¾ in. thick, producing at their tips small drooping and somewhat globose flowers rather less than ¼ in. across, dull purplish outside, the whole surface inside frosted-white, dotted with crimson, and very beautiful when seen under the microscope. Corolla-lobes united at the tips, with only very small fissures between them. S. Africa. (Kew.)

***Pentstemon triflorus.** (*G. C.* 1910, xlviii. 296.) Scrophulariaceae. H. A bushy plant, about 3 ft. high, with dark green leaves. Flowers 1½–1¾ in. long, coral-red, borne in loose panicles. Mexico. (Bees, Ltd.)

***Pertya sinensis.** (*K. B.* 1910, 174, as *Portya sinensis*.) Compositae. H. A bushy deciduous shrub, 4–6 ft. high, with slender ribbed branches. Leaves on the young branches alternate, ovate-lanceolate, acuminate, 2–3 in. long, ¾–1 in. broad, on the year-old branches less than half the size of the others, and produced 4–6 together in fascicles. Flower-heads pink, ½ in. across, solitary on a slender peduncle ½–1 in. long. Central China. (J. Veitch & Sons.)

Phaius Cooperi. (*K. B.* 1910, 159; *G. C.* 1910, xlvii. 46; xlviii. 253; *G. M.* 1910, 787.) Orchidaceae. S. A handsome species differing from *P. callosus* in its larger flowers and in having the spur of the lip twice as long. Sepals and petals bright red-brown in front, pale yellow behind, about 2 in. long. Lip funnel-shaped, about 1¾ in. long. white at first, soon changing to light yellow, with reddish markings in the throat and a pair of lateral red-brown blotches near the apex of the tube outside. Country unknown, possibly Malaya. (F. Sander & Sons.)

Philadelphus Satsumanus var. **nikoënsis.** (*M. D. G.* 1910, 249.) Saxifragaceae. H. Differs from the type in having ovate-elliptic or ovate-oblong long-acuminate leaves, which are hairy on both sides, especially on the nerves beneath. Pedicels glabrous or almost glabrous. Calyx glabrous. Japan. (Arnold Arboretum, Boston, U.S.A.)

***Picea complanata.** (*K. B.* 1910, 174.) Coniferae. H. Leaves needle-shaped, ¾–1 in. long, with the glaucous lines of stomata on the upper side only. Cones cylindrical, but tapering towards both ends, 4–5 in. long, 1¼ in. broad in the middle; scales somewhat resembling an oyster-shell in shape, slightly toothed on the upper edge. W. China. (J. Veitch & Sons.)

Picea orientalis semivirgata. (*M. D. G.* 1910, 288, 290.) H. A form in which the primary branches have only a few lateral branches, the plant thus having a loose somewhat twiggy appearance.

Pinus flexilis albo-variegata. (*M. D. G.* 1910, 288, 290.) Coniferae. H. Differs from the typical form in having many of the leaves white, the others being pale green. (Fritz Graf von Schwerin, Wendisch-Wilmersdorf, Germany.)

***Pistacia chinensis.** (*K. B.* 1910, 393, f.) Anacardiaceae. H. A deciduous tree attaining a height of 80 ft. Leaves pinnate: leaflets usually 10 or 12, occasionally 11 or 13, ovate-lanceolate, acuminate, 2½–3½ in. long, ¾ in. broad, unequally divided by the midrib. Flowers unisexual, unattractive, the male crowded in racemes about 2 in. long, the females in laxer racemes 7–9 in. long. Fruits the size of peppercorns, first red, then blue. Central China. (Kew; Arnold Arboretum, Boston, U.S.A.)

Platycerium Vassei. (*R. H.* 1910, 530.) Filices. S. A new species allied to *P. aethiopicum* from which it is easily distinguished by the habit of the sterile fronds and by the dichotomous branching of the fertile ones.

Sterile fronds smooth, closely adpressed to the support of the plant, oval, convex in front, not laciniate, with nerves slightly prominent ; fertile fronds crowded, regularly dichotomous. Mozambique. (Paris B. G.)

***Pleiocarpa mutica.** (*B. M.* t. 8343.) Apocynaceeae. S. Remarkable in the order for its fruit of 5 carpels. Shrub, 5 ft. high. Leaves opposite, elliptic or oblong, 3–6 in. long, 1½–2¼ in. broad, thinly coriaceous ; petiole 3 lin. long. Flowers in dense axillary globose clusters. Sepals ovate, about 1 lin. long. Corolla pure white ; tube cylindric, 6–8 lin. long ; lobes ovate or oblong, 3–3½ lin. long. W. Trop. Africa. (Glasgow B. G. ; Kew.)

Pleurothallis crinifera. (*O. R.* 1910, 40.) Orchidaceae. G. A very small plant with a creeping rhizome closely beset with leaves. Leaves orbicular, fleshy, light green, covered with round purple spots. Inflorescence short, bearing 4 flowers, each about ⅓ in. long and covered outside with long whitish hairs. Dorsal sepal oblong, light green, with pale brown dots ; lateral sepals united, red-purple, with a little green marbling near the margin. Petals broadly spathulate at the apex, light green. Lip 3-lobed, whitish, purple-spotted. Brazil. (Rev. J. C. B. Fletcher.)

Pleurothallis cuneifolia. (*Orchis*, 1910, 60.) G. Leaves very fleshy, lanceolate, apiculate, and with an acute tooth on each side at the apex. Scape and pedicels hair-like. Flowers 3½ lin. long. Lower half of sepals thin, almost transparent and glabrous, pale yellow, with carmine-red spots and transverse bands, upper half very fleshy, finely hairy, pale reddish brown. Petals and lip scarcely half as long as the sepals. Brazil. (Berlin-Dahlem B.G.) [Syn. *Lepanthes Wawraeana*, Barb.-Rodr.]

***Polemonium carneum.** (*G. C.* 1910, xlviii. 134, f. 49.) Polemoniaceae. H. A freely-branching plant 1–3 ft. high. Leaves pinnate ; leaflets ovate or oblong-lanceolate, 1½ in. long. Flowers 3 to 5 together in somewhat umbel-like inflorescences, rather large, salmon- or flesh-coloured, fading to purple. California. (Seeds were received by Mr. Stein, Island of Islay, Scotland, 50 years ago, and the plant has been grown unidentified till 1908.)

Polystachya dendrobiiflora. (*N. B.* v. 173.) Orchidaceae. S. The finest species of the genus. Flowers up to 20 together, in a short corymb, white, suffused with pale rose, in size and shape resembling those of *Dendrobium barbatulum* (B. M. t. 5918). Sepals 1 in. long, scarcely ¼ in broad. Petals slightly smaller. Lip ¾ in. long, nearly ½ in. broad, marked at the base with an elongated-triangular blood-red blotch. German E. Africa. (Berlin-Dahlem B. G.)

Polystachya golungensis. (*G. C.* 1910, xlviii. 463.) S. Plant about 4 in. high. Pseudobulbs short, bearing on the upper part narrow leaves of very firm texture. Inflorescence branched, with many small light yellow flowers. Tropical Africa. (W. E. Balston.)

***Polystachya paniculata.** (*G. C.* 1910, xlviii. 145, 462, f. 202 ; *O. R.* 1910, 279.) S. A curious and pretty species with flattened pseudobulbs, narrowly oblong leaves, and a crowded panicle of small flowers varying in colour from coppery-yellow to reddish-orange. The young growths are blotched with purple. Trop. Africa. (Sir Trevor Lawrence.)

Potentilla fruticosa var. **mandshurica.** (*R. H.* 1910, 57.) Rosaceae. H. Very similar to *P. fruticosa* var. *Vilmoriniana*, differing only in its very much smaller size and less erect branches. Mandshuria.

***Potentilla fruticosa** var. **Vilmoriniana.** (*R. H.* 1910, 56, f. 17.) H. An erect shrub attaining about 3 ft. in height, differing from the type in being much more whitish-villous, especially on the young branches and on the underside of the leaves, which are smaller. Flowers rather larger, pale sulphur-yellow. Tibet. (M. L. de Vilmorin, Les Barres, France.)

Primula anisiaca. (*G. C.* 1910, xlvii. 294, 388.) Primulaceae. H. A natural hybrid between *P. vulgaris* and *P. elatior*. (R. Farrer.)

Primula Briscoei. (*G. C.* 1910, xlviii. 219, 235.) H. A garden hybrid between *P. Bulleyana* and *P. japonica*. (J. Veitch & Sons.)

Primula sonchifolia. (*G. C.* 1910, xlvii. 58, f. 35.) H. An alpine species. Leaves oblong or obovate-oblong, up to 6 or 8 in. long, rounded at the apex, narrowed at the base into a broadly winged petiole. Scapes 3–5 in. high, appearing before the leaves, surrounded at the base by a number of large scales which are covered by a rich orange-coloured meal. Flowers 5–8 together. Corolla blue ; limb 7½–14 lin. across, having toothed or fringed lobes. N.W. Yunnan, China. (Bees, Ltd.)

Prunus japonica var. **Engleri.** (*Fedde, Repert.* viii. 23; *M. D. G.* 1910, 97.) Rosaceae. H. Leaves even the autumn ones rather densely shortly hairy beneath on the midrib and nerves, sparingly hairy between the nerves. Corolle pale flesh-coloured. Fruit bright scarlet, sometimes 5½ lin. long and 4½ lin. broad, apiculate at the apex, sometimes 8½ lin. long and 8 lin. broad, rounded at the apex. (Berlin - Dahlem B. G.; L. Späth, Berlin.)

Prunus japonica var. **Thunbergii.** (*Fedde, Repert.* viii. 23; *M. D. G.* 1910, 97.) H. Leaves quickly becoming quite glabrous. Corolla rose-coloured. (L. Späth, Berlin.)

Prunus Sweginzowii. (*Fedde, Repert.* viii. 62; *M. D. G.* 1910, 97, f.) H. A small quite glabrous shrub very similar to *P. nana*, from which it is chiefly distinguished by the large size and foliaceous character of most of the stipules, and the unequal very sharp double teeth of the leaves. Calyx tubular, 5 lin. long, with oblong glandular - fimbriate lobes. Petals oblong-obovate from a cuneate base, 5 lin. long, 3 lin. broad, deep rose. Turkestan. (M. von. Sivers, Roemershof, Riga.)

Psoralea affinis. (*B. M.* t. 8331.) Leguminosae. G. Cultivated for many years under the name of *P. pinnata* or as a variety of that species. It differs from the true *P. pinnata* in having peduncles as long as the leaves, and very obtuse calyx-lobes, which are densely covered on both sides with black hairs. S. Africa.

Pteris Degoesi. (*T. H.* 1910, 9.) Filices. G. Apparently of garden origin. No description given. (M. Degoes.)

Pteris Lecouteulxi. (*R. H.* 1910, 392.) G. Apparently of garden origin. No description given. (Le Couteulx, Chesnay, Seine - et - Oise, France.)

Pterocarya hupehensis. (*G. C.* 1910, xlvii. 291.) Juglandaceae. H. A tree from 30 to 70 ft. high, with a spreading bushy head. Leaves pinnate; leaflets 7–9, hairy along the veins and in the axils of the veins. Fruits glabrous, with large rounded wings, arranged in spikes up to 2 ft. long. Central China. (J. Veitch & Sons.)

***Pyrus Folgneri.** (*K. B.* 1910, 175.) Rosaceae. H. A species of the *Micromeles* group. A slender tree. 10–30 ft. high, with graceful often pendulous branches. Leaves oval, tapering at both ends, 2–3½ in. long, ¾–1½ in. broad, serrulate, dark green and glabrous above, covered beneath with a white felt. Flowers white, in lax corymbs. Fruits red, ovoid, ¼ in. long. Central China. (J. Veitch & Sons.)

Ranunculus Enysii. (*G. C.* 1910, xlviii. 360.) Ranunculaceae. H. A slender leafy glabrous plant, 6–15 in. high. Leaves all radical, 3–5-foliolate or biternate; leaflets long-stalked, very variable in size and amount of cutting, sometimes large and rounded, toothed or 3–5-lobed, sometimes cut to the base into 3–5 incised toothed or lobed segments, occasionally pinnately divided; petioles 2–6 in. long. Scapes longer than the leaves. Flowers yellow, ½–1 in. across. The description is mainly from Cheeseman's *Manual of the New Zealand Flora*, 13. New Zealand. (G. Reuthe.)

***Ranunculus insignis.** (*G. C.* 1910, xlvii. 360.) H. A stout erect plant, 1–3 ft. high, usually villous. Radical leaves large, rounded-cordate or reniform, thick, leathery, crenate, often shortly lobed, 4–9 in. across; petioles stout; stem leaves smaller, the upper cut and lobed. Peduncles often very many, stout. Flowers golden-yellow, 1–2 in. across. The description is from Cheeseman's *Manual of the New Zealand Flora*, 10. New Zealand. (G. Reuthe.)

***Rehmannia Briscoei.** (*G. C.* 1910, xlvii. 189, f. 80; *G. M.* 1910, 240.) Scrophulariaceae. G. A garden hybrid between *R. angulata* of gardens (=*R. elata*, N.E. Br.) and *R. Henryi*. The reverse cross has been made at Kew. See *K. B.* 1910, 325. (J. Veitch & Sons.)

***Rehmannia elata.** (*B. M.* sub t. 8302.) G. The name proposed for the plant included in the list of 1903 as *R. angulata*. It is twice as large as the true *R. angulata* and differs in the lobing of the leaves and in the colour of the rather larger flowers. Central China.

***Rhododendron concinnum.** (*Veitch, N. H. P.* 1910, 5, 7, f.; *K. B.* 1910, 115.) Ericaceae. H. A dwarf densely branched shrub. Leaves ovate or oval-oblong, 1–1¾ in. long including the petiole, very obtuse at the base, at first densely lepidote on both sides, finally naked above, at first yellow, then silvery, with reddish scales beneath. Flowers fasciculate, on rather slender peduncles 4–5 lin. long. Corolla

funnel-shaped, about ¾ in. long, lepidote outside, villous below the middle inside, pale yellow, faintly spotted on the upper lobe. Description chiefly from *Journ. Linn Soc.* xxvi. 21. W. China. (J. Veitch & Sons.)

Rhododendron flavidum. (*B. M.* t. 8326.) H. A small shrub, 1½-2 ft. high, densely branched. Leaves closely set, persistent, ovate-oblong, 5–10 lin. long, closely scaly on both sides; petiole 1–1½ lin. long. Flowers 3–5 together at the tips of the twigs. Pedicels 2–3½ lin. long. Calyx almost 2-lipped, herbaceous, lobes ovate, 2–3 lin. long. Corolla yellow, almost regular, nearly rotate, about 1¼ in. broad. W. China. (J. Veitch & Sons.) [Syn. *R. primulinum*, Hemsl. in G. C. 1910, xlvii. 4, 229, f. 101.]

***Rhododendron Griffithianum × campylocarpum.** (*K. B.* 1910, 326.) H. A garden hybrid. (Kew.)

***Rhododendron Harrovianum.** (*G. C.* 1910, xlvii. 4; *B. M.* t. 8309) H. Shrub, 2–3 ft. high, with straight rigid branches. Leaves persistent, narrow-lanceolate, 1¼-3 in. long, dark shining green above, closely lepidote beneath; petiole 2–4 lin. long. Flowers in clusters of 3–5 at the tips of the branches; pedicels ½–¾ in. long. Corolla campanulate, ¾-1 in. long, about 1 in. across, reddish- or violet-purple, with yellowish blotches on the upper lobes. Ovary closely lepidote. W. China. (J. Veitch & Sons.)

***Rhododendron intricatum × indicum album.** (*K. B.* 1910, 326.) H. A garden hybrid. (Kew.)

Rhododendron Kesselringii. (*M. D. G.* 1910, 286.) H. A natural hybrid between *R. Smirnowii* and *R. ponticum*. (St. Petersburg Imp. Forest Inst.)

***Rhododendron mucronulatum.** (*B. M.* t. 8304.) H. A dwarf deciduous shrub. Leaves thin, lanceolate, 1¼–3 in. long, sparingly lepidote on both sides; petioles 2–3 lin. long. Flowers in groups of 2–5 near the tips of the twigs, shortly peduncled. Corolla broad-campanulate, pale reddish-purple, 1¾–2 in. across. Central Asia. (Kew.)

Rhododendron primulinum. See R. flavidum.

***Rhododendron spinuliferum.** (*R. H.* 1910, 404, col. t.) H? An erect shrub; young branches with a reddish bark and greyish hairs. Leaves narrowly lanceolate, acuminate, narrowed at the base, 2½–3⅓ in. long, 5–7½ lin. broad, almost glabrous above, whitish-pubescent and with prominent reddish veins beneath, revolute on the margins. Flowers in terminal heads of 5 to 12, on peduncles 4–5 lin. long. Corolla urn-shaped-oblong, ¾–1 lin. long, 4–5 lin. broad in the upper part, pale orange-yellow, the upper part a bright scarlet-red; lobes erect, concave, obtuse, imbricate. Yunnan, China. (M. L. de Vilmorin, Les Barres, France.)

***Rhododendron Vaseyi × cinnabarinum.** (*K. B.* 1910, 326.) H. A garden hybrid. (Kew.)

Rosa britzensis. (*Fedde, Repert.* viii. 21; *M. D. G.* 1910, 93, f.) Rosaceae. H. A new species of the section *Caninae - Eucaninae* resembling *R. Jundzillii* in the large flowers and long pedicels, but differing in having the petals finally white and in having persistent sepals. The flowers are usually solitary, very rarely in pairs, and are 3⅓–4 in. across, borne on pedicels ¾–1½ in. long. Kurdistan. (L. Späth, Berlin.)

***Rosa Jackii.** (*M. D. G.* 1910, 251.) H. Distinguished from *R. moschata* in its procumbent habit, in having glandular-serrate stipules, persistent bracts and globose-ovate, instead of elongated gradually acuminate, flower-buds. It is possibly a hybrid between *R. multiflora* and *R. Wichuraiana*. Flowers white, 1½ in. across. Corea. (Arnold Arboretum, Boston, U.S.A.)

***Rosa macrophylla × rugosa.** (*K. B.* 1910, 326.) H. A garden hybrid. (Kew.)

***Rosa pratincola** f **alba.** (*M. D. G.* 1910, 252.) H. Erect, about 18 in. high. Branches with numerous slender prickles of various sizes. Leaflets 7–11, usually 9, obovate-oblong, obovate or elliptic, fresh green above, paler green beneath; stipules rather narrow, entire or with a few glandular teeth in the upper part. Flowers white, about 1¼ in. across, 3 to 11 together in terminal umbellate panicles. Sepals lanceolate, continued into a long appendage broadened above. Fruit roundish, red, about 5 lin. across. Allied to *R. acicularis*. United States. (Arnold Arboretum, Boston, U.S.A.)

Rosa Sweginzowii. (*Fedde, Repert.* viii. 22; *M. D. G.* 1910, 95, f.) H. A new species of the section *Cinnamomeae* and included in the same

group as *R. macrophylla*. It is characterised by the remarkably broad flat prickles, which resemble those seen in *R. nutkana*, and by the slender fruits. Flowers solitary or 2 or 3 together. Corolla about 1¾ in. across, rose. Mature fruits deep orange or orange-scarlet, about 1 in. long and ½ in. broad, crowned by the erect sepals. Probably China (Kansu). (M. von. Sivers, Roemershof, Riga.)

*Rubus adenophorus. (*K. B.* 1910, 382.) Rosaceae. H. Remarkable in having sepals stems and petioles more or less densely covered with dark purple stalked glands. Stems very thick, prickly. Leaves ternate or the upper more rarely simple; leaflets unequal, doubly crenate, green and hairy on both sides; terminal leaflets cordate-ovate, 1¾–2⅓ in. long; lateral subsessile, smaller. Racemes short, 6–10-flowered. Petals broadly clawed, about 2½ lin. long, rose. Fruits 5 lin. broad, black, edible. China. (Arnold Arboretum, Boston, U.S.A.; Kew.)

*Rubus corchorifolius. (*K. B.* 1910, 46.). H. Erect-growing, with long terete stems covered with fine down and armed with straight prickles up to ½ in. long. Leaves simple, dull green, ovate-cordate, usually 3-lobed on the barren stems, acuminate, up to 7 in. long, 3½–4½ in. broad, coarsely toothed, finely pubescent beneath, furnished with hooked prickles on the petiole and midrib. Flowers solitary, white, borne on short lateral twigs. Fruit bright red, large. Central & W. China. (Arnold Arboretum; Kew.)

*Rubus hupehensis. (*K. B.* 1910, 46.) H. Stems prostrate, dark, terete, thinly grey-flocculent when young, armed with very short decurved prickles. Leaves simple, oblong-lanceolate, 3–4½ in. long, 1½ in. broad, acuminate, rounded at the base, serrate, pale grey-tomentose beneath; petiole about ¼ in. long. Flowers 3–7, in a short terminal raceme. Central China. (Arnold Arboretum; Kew.)

*Rubus ichangensis. (*G. C.* 1910, xlviii. 275, f. 114.) H. A distinct and beautiful species remarkable for the metallic-like lustre of its leaves, which are elongated, acuminate, cordate at the base, distantly toothed, and borne on long petioles. Flowers small. Fruits red. See *Journ. Linn. Soc.* xxiii. 231. Central China. (Hon. Vicary Gibbs.)

*Rubus Lambertianus. (*G. C.* 1910, xlviii. 275, f. 115.) H. A vigorous quickly-growing species, with foliage that develops a beautiful colour in autumn. Flowers small, whitish, in clusters at the ends of the current year's growth. China. (Hon. Vicary Gibbs.)

*Rubus Playfairii. (*K. B.* 1910, 48.) H. A rambling shrub. Stems very slender, dark green, covered when young with a cobweb-like indumentum and armed with small decurved spines. Leaves 3–5-foliolate; leaflets lanceolate to linear-lanceolate, serrate, the terminal one largest, up to 6 in. long and shortly stalked, all bright green above and covered with a close pale grey felt beneath; stipules ½ in. long, very deeply laciniated. Flowers ½ in. across. Fruit black. S. E. China. (Kew.)

*Rubus polytrichus. (*K. B.* 1910, 48.) H. Dwarf. Stems prostrate, without prickles, but densely covered with pale yellowish-brown hairs ⅛ in. long. Leaves simple, cordate, about 3 in. long and 2 in. broad, sharply toothed, white-felted beneath and bristly hairy on the midrib and chief veins; hairs on the upper side in rows between the chief veins. Flowering-stems erect. Flowers white, 1 in. across or more. Fruit bright red, rather large. W. China. (Arnold Arboretum; Kew.)

Rubus simplex. (*Späth Cat.* 1910–11, n. 143, 121.) H. A small-growing species, forming a dwarf roundish densely branched bush. Leaves trifoliolate; leaflets ovate-lanceolate, fresh green. Flowers white. Fruits orange-red. Described and figured in *Hook. Ic. Plant.* t. 1948. Central China. (L. Späth, Berlin.)

Sarracenia Willmottae. (*G. C.* 1910, xlvii. 360; *G. M.* 1910, 433, 435, f.) Sarraceniaceae. A garden hybrid between *S. purpurea* and *S. Stevensii*. (A. J. Bruce.)

Saxifraga Burseriana magna. (*G. C.* 1910, xlvii. 164, f. 71.) Saxifragaceae. H. Distinguished from the variety *major* by having a very densely tufted habit, the flowers therefore arising very near one another, sometimes 20 from a tuft 2 in. across. Flowers white, larger (more than 1 in. across). (R. Farrer.)

*Saxifraga oppositifolia latina. (*G. C.* 1910, xlvii. 294.) H. A robust variety, with large flowers round in outline and of a vivid colour. (R. Farrer.)

*Saxifraga oppositifolia speciosa. (*G. C.* 1910, xlvii. 294.) H. Bolder and stouter in growth than other

varieties, with very large delicate pale rose flowers having 6–8 instead of the usual 5 petals. (R. Farrer.)

*Saxifraga Probynii. (*G. C.* 1910, xlviii. 426.) H. The same as the plant usually grown in English gardens under the name of *S. cochlearis minor*.

Serjania clematidifolia. (*R. H.* 1910, 68, f. 21.) Sapindaceae. S. A climbing evergreen shrub; branches 6–10 ft. long. Leaves alternate, long-petiolate, 3-foliolate; leaflets obovate, obtuse, toothed, slightly pubescent when young, afterwards shining, prominently veined beneath. Flowers small, white, inconspicuous, 5–7 together in compact clusters, arranged in panicles at the ends of the branches. Fruits 3-winged. Brazil. (Tunis Jardin d'Essais.)

*Shortia uniflora grandiflora. (*G. C.* 1910, xlvii. 172; *G. M.* 1910, 205, 221, f.) Diapensiaceae. Flowers larger than in the type, being 1¾ in. across. (Sir E. Hambro.)

*Shortia uniflora grandiflora × galacifolia. (*K. B.* 1910, 327.) H. A garden hybrid. (Kew.)

Sigmatostalix peruviana. (*K. B.* 1910, 371.) Orchidaceae. S. A tufted plant 2–3 in. high. Pseudo-bulbs ovoid or ovoid-oblong, about 7½ lin. long, 4-leaved at the base, 1-leaved at the apex. Leaves linear, 1¼–2 in. long, ¾–1¼ in. broad. Scapes lateral, slender, about 2 in. long, few-flowered. Sepals and petals oblong, 1½ lin. long, straw-coloured, with a dark purple band at the base of the petals and the dorsal sepal. Lip deltoid-reniform, 2 lin. long, 2½ lin. broad, light yellow, with a shining orange-yellow crest. Peru. (F. Sander & Sons.)

Sobralia blanda. (*G. C.* 1910, xlviii. 273.) Orchidaceae. S. A new species allied to the *S. macrantha* group. The plant is of medium size, with rather large bright green leaves. Flowers solitary, arising in succession from the leafy sheaths, 6 in. across when fully developed, white, except the throat and middle portion of the disc of the lip, which are golden-yellow. Country unknown. (P. Wolter, Magdeburg, Germany.)

Sobralia Charlesworthii. (*G. C.* 1910, xlvii. 353; *O. R.* 1910, 184; *G. M.* 1910, 432.) S. A handsome species nearly allied to *S. Ruckeri* of which it is possibly a very fine form. Flowers rich rose-purple, with a broad purple band round the lip and a bright yellow crest. Colombia. (Charlesworth & Co.)

Sobralia Cliftoniae. (*G. C.* 1910, xlvii. 269; *O. R.* 1910, 150; *G. M.* 325, 341, f.) S. A rather dwarf very floriferous species, something like a dwarf *S. macrantha* in habit, but the flowers are white, of good substance, with a tinge of purple in the throat of the lip. Ecuador. (F. Sander & Sons.)

Solanum Gaertnerianum. (*Gfl.* 1910, 436, f. 47; *R. H.* 1910, 559.) Solanaceae. H. H. A graft hybrid between *S. nigrum* and *Lycopersicum esculentum*, differing from both in having curiously recurved leaves. (Berlin Univ. G.)

Solanum Koelreuterianum. (*Gfl.* 1910, 436, f. 47; *R. H.* 1910, 559.) H. H. A graft hybrid between *S. nigrum* and *Lycopersicum esculentum*, resembling the latter in structure and habit, but it is glabrous like the former. (Berlin Univ. G.)

*Solanum tubingense. (*Gfl.* 1910, 436, f. 47; *R. H.* 1910, 559.) H. H. A graft hybrid between *S. nigrum* and *Lycopersicum esculentum*. It resembles the former in structure and the latter in hairiness. (Berlin Univ. G.)

Solidago spectabilis. (*G. C.* 1910, xlviii. 252; *G. M.* 1910, 787, f.) Compositae. About 2½ ft. high. Flowers rich golden-yellow, in erect almost pyramidal panicles. N. America. (Paul & Son, Cheshunt.)

Sophro-laelia Ortoniana. (*G. C.* 1910, xlviii. 253.) Orchidaceae. G. A garden hybrid between *Sophronitis grandiflora* and *Laelia Diana*. (R. G. Thwaites.)

Spathoglottis Soutteriana. (*G. C.* 1910, xlviii. 139, as *S. Southeriana*.) Orchidaceae. S. A pretty species having a general resemblance to S. *plicata*, but the flowers are smaller. They are borne in upright spikes, and are more than 1 in. across. Sepals and petals light rose-colour. Lip 3-lobed, the lateral lobes as large as the median one, a darker shade of rose, yellowish at the base. Column purplish-rose. Queensland. (Sir Trevor Lawrence.)

Spathoglottis zebrina. (*G. C.* 1910, xlviii. 319; *O. R.* 1910, 341.) S. A garden hybrid between *S. Fortunei* and *S. plicata*. (Sir J. Colman.)

Spiraea arborea. (*Spath Cat.* 1910–11, n. 143, 127.) Rosaceae. H. Very

similar to *S. Lindleyana*, but it is more tree-like. Young plants have the shoots coloured, and the rhachis of the leaves is dark brown-red. Central China. (L. Späth, Berlin.) [*Sorbaria arborea*, C. K. Schneider.]

Spiraea mollifolia. (*Veitch, N. H. P.* 1910, 12.) H. "A plant of prostrate habit, with small rounded alternate leaves which on the young growths are very hairy." W. China. (J. Veitch & Sons.)

***Spiraea Wilsonii.** (*Veitch, N. H. P.* 1910, 7, 9, f.) H. Very similar to *S. Henryi*. It is a vigorous-growing species, with long arching shoots bearing corymbs of white flowers. Central China. (J. Veitch & Sons.)

***Stachys corsica.** (*G. C.* 1910, xlviii. 210, 262.) Labiatae. H. H. A compact low-growing species, only 1–2 in. high, with small leaves and pretty straw-coloured flowers having a purple lower lip. Corsica. A re-introduction. It was in cultivation in 1823. (Kew.)

***Stanhopea elegantula.** (*K. B.* 1910, 161.) Orchidaceae. S. Allied to *S. saccata*, but the flowers are smaller, the horns of the lip are shorter, and the epichile is subtruncate. Flowers primrose-yellow, with the base of the petals and hypochile of the lip orange, sparsely dotted with brown. Sepals 1¾–2 in. long. Petals 1½ in. long. Lip nearly 2 in. long. Country unknown. (Kew.)

Stapelia cantabrigiensis. (*Berger, Stap.* 293.) Asclepiadaceae. G. A hybrid, one of the parents of which is probably *S. hirsuta*. Its flowers are 6½–8 lin. across, broadly campanulate, with long-acuminate lanceolate lobes, greenish, suffused with red outside, brown-red inside, rather densely covered with red-brown hairs on the base of the corolla-lobes and in the throat. (La Mortola.)

Stapelia magna. (*Berger, Stap.* 295.) G. A hybrid resembling in several characters *S. cantabrigiensis*, probably also derived from *S. hirsuta*. It has been cultivated under the name of *S. grandiflora*. Its flowers are dark brown with yellowish markings, and are clothed inside, excepting the upper half of the lobes, with violet-red curled soft hairs. (La Mortola.)

***Statice Perezii.** (*G. C.* 1910, xlviii. 64.) Plumbaginaceae. H. H. More branched and not so tall as *S. arborea* and *S. macrophylla*. Flowers violet-blue, produced in abundance. Canary Isles.

***Stranvaesia undulata.** (*Veitch, N. H. P.* 1910, 10, f.) Rosaceae. H. A handsome evergreen shrub resembling a *Photinia*. Leaves dark green, coriaceous, broadly lanceolate. Flowers small, white, borne in corymbs. Fruits orange-red, about the size of a pea. Central China. (J. Veitch & Sons.)

***Strelitzia kewensis.** (*K. B.* 1910, 65, 327; *G. C.* 1910, xlvii. 217, f. 94; *G. M.* 1910, 260.) Scitamineae. S. A garden hybrid between *S. Reginae* and *S. augusta*. (Kew.)

Styrax Hemsleyanus. (*B. M.* t. 8339.) Styracaceae. H. Tree up to 20–30 ft. high, with white bark. Leaves alternate or almost opposite, usually broadly obovate-elliptic or obliquely ovate, ¾–5 in. long, 1¾–4 in. broad, denticulate, glabrous above, sparingly stellate-pubescent on midrib and nerves beneath. Inflorescence 3–6 in. long, racemose, axillary or terminal, 8–20 flowered. Flowers 8–10 lin. long, ¾–1¼ in. across, white. Central China. (J. Veitch & Sons.)

Syringa Sweginzowii. (*Fedde, Repert.* viii. 9; *M. D. G.* 1910, 112, f.) Oleaceae. H. Nearly allied to *S. rosea*, differing in having yellowish-reddish flowers and smooth acute fruits. Leaves oblong or ovate, 2–3 in. long, ¾–1½ in. broad, usaully abruptly caudate-acuminate, somewhat narrowed at the base, quite glabrous above, whitish-pilose on the principal veins beneath; petioles up to 5 lin. long. Panicles terminal or lateral, 6–10 in. long. Corolla-tube 4 lin. long; lobes oblong-ovate, subacute. Probably East Asia. (M. von Sivers, Roemershof, Riga.)

Syringa tomentella. (*M. D. G.* 1910, 113, f.) H. This plant has been distributed as *S. velutina*, and under that name is included in the list of 1909. Corea; W. China.

Syringa Wolfi. (*Fedde, Repert.* ix. 81.) H. A tall shrub with the habit of *S. villosa*. Leaves elliptic, 4½–5½ in. long, 1¾–2½ in. broad, more or less acute at the base, glabrous above, glabrous or pilose on the nerves beneath; petiole 5–7½ lin. long. Inflorescence up to 11½ in. long and 5½ in. broad. Flowers lilac, fragrant, 9–10 lin. long including the erect corolla-lobes. N. China? (St. Petersburg Imp. Forest Inst.)

Taxus baccata. (*M. D. G.* 1910, 120, 121.) Coniferae. H. Three forms distinguished from the type by their

habit of growth are described under the names of **compacta, nutans** and **pygmaea.** (H. den Ouden & Son, Boskoop, Holland.)

Thuya occidentalis Beteramsii. (*M. D. G.* 1910, 288, 290.) Coniferae. H. A colour form, the young growths being copper-coloured, gradually changing to green. (E. Beterams, Geldern, Lower Rhine. Germany.)

Trevoria Lehmanni. (*O. R.* 1910, 297, f. 18.) Orchidaceae. S. The name proposed for the plant figured in the *B. M.* t. 7805 as *T. Chloris.* It differs from the true *T. Chloris*, Lehm., which is included in the list of 1897, by the much broader less attenuated petals, and in having the front lobe of the lip ovate-elliptic rather than linear. Andes of Colombia. (Sir Trevor Lawrence.)

Trichocaulon Dinteri. (*Berger, Stap.* 30.) Asclepiadaceae. G. A new species resembling *F. cactiforme* (*Stapelia cactiformis*), but easily distinguished by its smaller flowers (3½–4½ lin. across) of a darker colour. German S. W. Africa. (La Mortola.)

Trichoglottis Solerederi. (*Fedde, Repert.* viii. 98.) Orchidaceae. S. Stems elongated. Leaves fleshy, sub-lanceolate, up to 5 in. long and about 1 in. broad. Racemes 1-flowered. Sepals obovate-oblong, 4½–5 lin. long, bright green, each with 5 transverse brown-purple bands. Petals much smaller, similar in colour to the sepals, but with only 3 bands. Lip ½ in. long, white but apparently soon becoming yellowish, with two blood-red spots on the disc. Philippines. (Erlangen B. G.)

Trilumna Gouldiana. (*G. C.* 1910, xlvii. 126; *O. R.* 1910, 88.) Orchidaceae. G. A garden hybrid between *Trichopilia suavis* and *Pilumna nobilis* (*Trichopilia fragrans* var. *nobilis*). (Mrs. Wood.) [The name should be *Trichopilia Gouldiana.*]

***Tristellateia australis.** (*B. M.* t. 8334.) Malpighiaceae. S. A strong climbing shrub with pendent shoots. Leaves opposite, ovate or ovate-oblong, 2–4 in. long, 1–2¼ in. broad, glabrous; petioles ¼–¾ in. long. Racemes 2–6 in. long, 12–16-flowered. Flowers opposite, shortly peduncled. Petals 5, oblong or ovate-oblong, 5–6 lin. long, yellow; claw 1 lin. long. Stamens 10; filaments finally deep red. Malaya and Australasia. (Kew.)

***Tulipa biflora** var. **turkestanica.** (*G. C.* 1910, xlvii. 85, f. 47.) Liliaceae. H. More robust in growth and larger in all its parts than the type, often producing 4 or 5 flowers on the branched scape. Turkestan. (Kew.)

Tulipa Hoogiana (*G. C.* 1910, xlviii. 53, suppl. ill.) H. A new species belonging to the section *Eriobulbi*, and somewhat similar to *T. Oculus-solis.* Stem, including flower, 6–18 in., usually 9–12 in. high, quite smooth. Leaves quasi-opposite, 4–6, lanceolate, tapering, the lowest 8–10 in. long and 1½–3 in. broad, smooth, with a very narrow membranous white shortly ciliated margin. Flower scarlet or brilliant red, with a large black blotch bordered with orange on the base of each of the broad somewhat abruptly acuminate segments. Stamens with blackish-violet filaments and blackish anthers. Bukhara. (C. G. van. Tubergen, Jr., Haarlem.)

***Typhonodorum Lindleyanum.** (*B. M.* t. 8307.) Araceae. S. An evergreen glabrous shrub. Stem stout, 3–10 ft. high, 4–12 in. thick. Leaves deeply cordate or sagittate, 1¼–3½ ft. long, 7 in.–2 ft. across; petiole stout, terete, 2–4½ ft. long. Peduncle shorter than the petiole, 1–1¾ in. thick. Spathe suberect, 1½–2 ft. long; tube 3–5 in. long, oblong, green; blade 13–19 in. long, 3–5 in. across, lanceolate, convolute below, yellow. Seeds 1¾–2 in. across, flattened-orbicular, edible. Madagascar. (Kew.)

Ulmus arbuscula. (*M. D. G.* 1910, 286.) Urticaceae. H. A hybrid between *U. pumila* and *U. montana.* (St. Petersburg Imp. Forest Inst.)

***Urceocharis edentata.** (*K. B.* 1910, 24.) Amaryllidaceae. S. Probably a natural hybrid between a species of *Urceolina* and a species of *Eucharis.* It differs from *Urceocharis Clibrani* in having the corona between the filaments without teeth. Peru. (F. Sander & Sons.)

***Utricularia prehensilis.** (*G. C.* 1910, xlviii. 447, f. 191.) Lentibulariaceae. S. A quickly growing species, with riband-shaped leaves that float on the surface of the water, and yellow flowers. Tropical and South Africa; Madagascar. (Edinburgh B. G.)

Vanda coerulea Sanderae. (*G. C.* 1910, xlviii. 398, 415, f. 172; *O. R.* 1910, 415; *G. M.* 1910, 957.) Orchidaceae. S. Flowers white, with the tips and margins of the sepals tinged with magenta-pink, the petals flushed with the same colour, and the lip a deep magenta. (F. Sander & Sons.)

Vanda Floreyae. (*O. R.* 1910, 343; *G. C.* 1910, xlviii. 320, as *V. Floryiae.*) S. Supposed to be a natural hybrid. It resembles *V. coerulea* in habit, but the flowers are smaller, very different in shape, and are white, with a violet lip. (S. Florey.)

Verbascum phlomoides album. (*G. C.* 1910, xlviii. 333.) Scrophulariaceae. H. Flowers of a beautiful shade of creamy-white, with conspicuous anthers. (Gibson & Co.: W. E. Gumbleton.)

***Veronica edinensis.** (*G. C.* 1910, xlviii. 38, 103.) Scrophulariaceae. H. A garden hybrid between *V. Hectori* and *V. pimelioides.* (R. Lindsay.)

***Veronica myrtifolia.** (*G. C.* 1910, xlviii. 103.) H.? A garden hybrid between *V. Balfouriana* and *V. salicifolia.* (R. Lindsay.)

***Viburnum coriaceum.** (*Veitch, N. H. P.* 1910, 10.) Caprifoliaceae. H. An evergreen shrub attaining a height of 12–15 ft. Leaves coriaceous, glabrous, oblong-lanceolate, 4–9 in. long, about 3 in. broad. Flowers cream-white. W. China. (J. Veitch & Sons.)

Viburnum hupehense. (*Sargent, T. & S.* ii. 116; *Späth Cat.* 1910–11, n. 143, 136.) H. Nearly related to *V. dilatatum*, differing chiefly in its orbicular-ovate leaves and stipulate petioles. Central China. (L. Späth, Berlin.)

***Viburnum phlebotrichum.** (*Veitch, N. H. P.* 1910, 12.) H. A deciduous shrub with ovate leaves, which in the young state have a metallic lustre. Flowers white, in corymbs. Fruits scarlet. China. (J. Veitch & Sons.) [This does not appear to be the true *V. phlebotrichum*, Sieb. & Zucc., which, according to Rehder in Sargent's *Trees & Shrubs*, ii. 43, is confined to Japan.]

***Viburnum theiferum.** (*Veitch, N. H. P.* 1910, 12.) H. Distinguished from *V. phlebotrichum* by its more vigorous habit, larger leaves and longer petioles. The young wood is a rich chocolate-brown. Central and W. China. (J. Veitch & Sons.)

Viola florariensis. (*G. C.* 1910, xlvii. 314.) Violaceae. H. Supposed to be a hybrid between *V. calcarata* and *V. cornuta.* (H. Correvon, Floraire. Geneva.)

Vitex incisa var. **heterophylla.** (*M. D. G.* 1910, 247.) Verbenaceae. H. Leaves long-stalked, 5-foliolate; leaflets more or less toothed or sinuate, often doubly toothed. Flowers sky-blue, in terminal panicles. China. (C. Sprenger, Corfu.)

Warrea Hookeriana. (*O. R.* 1910, 360.) Orchidaceae. S. Flowers rather larger than those of *W. bidentata*, but very similar in colour, being of a peculiar shade of reddish-purple, rather paler in the centre; they are borne in erect scapes and are somewhat globose in shape. Peru. (F. Sander & Sons.) [Syn. *Phaius Hookerianus*, Reichb. f.]

Zygopetalum chloranthum. (*G. C.* 1910, xlvii. 162.) Orchidaceae. G. A new species closely allied to *Z. Murrayanum* (B. M. t. 3674), but it is smaller in every part, and the flowers have no trace of red on the lip and column. Bracts of the inflorescence comparatively large, embracing the lower half of the pedicel with the ovary. Flowers small for the genus, greenish and unattractive, hairy inside, fragrant. Possibly a hybrid between a *Zygopetalum* and a *Lycaste.* Country unknown. (Baron Max von Fuerstenberg, Hugenpoet, Essen, Germany.)

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1911.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX IV.—1911.

LIST of STAFFS of the ROYAL BOTANIC GARDENS, Kew, and of Botanical Departments, Establishments and Officers at Home, and in India and the Colonies, in Correspondence with Kew.

* Trained at Kew. † Recommended by Kew.

Royal Botanic Gardens, Kew.—

Director - - - - -	Lieut.-Col. D. Prain, I.M.S., C.I.E., M.A., M.B., LL.D., F.R.S., F.L.S.
Assistant Director - - -	Arthur W. Hill, M.A., F.L.S.
Assistant (Office) - - -	*John Aikman.
,, ,, - - -	*William Nicholls Winn.

Keeper of Herbarium and Library	Otto Stapf, Ph.D., F.R.S., F.L.S.
Assistant Keeper (Cryptogams) -	George Massee, F.L.S.
,, ,, (Phanerogams)-	Charles Henry Wright, A.L.S.
,, ,, (Herbarium) -	Nicholas Edward Brown, A.L.S.
,, (Herbarium) - -	*Robert Allen Rolfe, A.L.S.
,, ,, - -	*Sidney Alfred Skan.
,, ,, - -	Thomas Archibald Sprague, B.Sc., F.L.S.
,, ,, - -	Arthur Disbrowe Cotton, F.L.S.
,, ,, - -	Jessie Jane Clark, B.Sc.
,, ,, - -	Elsie Maud Wakefield.
,, for Tropical Africa -	*John Hutchinson.
,, for India - - -	William Grant Craib, M.A.

Assistant Keeper (Jodrell Laboratory).	Leonard Alfred Boodle, F.L.S.

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Royal Botanic Gardens, Kew—*continued.*

Keeper of Museums - - -	John Masters Hillier
Assistant (Museums) - - -	*John H. Holland, F.L.S.
" " - - -	*William Dallimore.
Preparer - - - - -	George Badderly.

Curator of the Gardens - -	William Watson, A.L.S.
Assistant Curator - - -	*William J. Bean.
Foremen :—	
Herbaceous Department - -	*Walter Irving.
Arboretum - - - -	*Arthur Osborn.
Greenhouse and Ornamental Department.	*John Coutts.
Tropical Department - -	*Charles P. Raffill.
Temperate House - - -	*William Taylor.
Storekeeper - - - -	*George Dear.

Aberdeen.—University Botanic Garden :—

Professor - - -	J. W. H. Trail, M.A., M.D., F.R.S., F.L.S.

Cambridge.—University Botanical Department :—

Professor - - -	A. C. Seward, M.A., F.R.S., F.L.S.
Curator, University Herbarium.	C. E. Moss, D.Sc.
Curator, University Museum.	H. H. Thomas, B.A.
Curator of Garden -	*Richard Irwin Lynch, M.A., A.L.S.

Dublin.—Royal Botanic Gardens, Glasnevin :—

Keeper - - -	Sir Frederick W. Moore, M.A., A.L.S.
Assistant - - -	*C. F. Ball.

Trinity College Botanic Gardens :—

Professor - - -	H. H. Dixon, Sc.D., F.R.S.

Edinburgh.—Royal Botanic Garden :—

Regius Keeper - -	I. B. Balfour, M.A., M.D., LL.D., Sc.D., F.R.S., F.L.S.
Assistant (Museum) -	H. F. Tagg, F.L.S.
" (Herbarium)	*J. F. Jeffrey.
Head Gardener - -	*R. L. Harrow.
Assistant Gardener -	Henry Hastings.

Glasgow.—Botanic Gardens :—

University Professor -	F. O. Bower, M.A., Sc.D., F.R.S., F.L.S.
Curator - - -	James Whitton.

Oxford.—University Botanic Garden :—

Professor - - -	SydneyH.Vines,M.A., Sc.D., F.R.S., F.L.S.
Curator - - -	*William Baker.

AFRICA.

British East Africa Protectorate.—

Nairobi -	Director of Agriculture.	Hon. A. C. Macdonald.
	Assistant - - -	*Henry Powell.
	Conservator of Forests	E. Battiscombe.

Cape Colony.—

Cape Town -	Professor of Botany, South African College.	Prof. H. H. W. Pearson, M.A., Sc.D., F.L.S
	Curator, Bolus Herbarium.	Miss L. Kensit.
	Conservator of Forests	J. S. Lister, I.S.O.

Gardens and Public Parks :—

Superintendent - -	*G. H. Ridley.

Grahamstown.—Albany Museum :—

Superintendent of Herbarium.	S. Schönland, Ph.D., F.L.S.

Gardens and Public Parks :—

Curator - - -	E. J. Alexander.
Port Elizabeth - Superintendent - -	John T. Butters.
King Williamstown. Curator - - -	George Lockie.
Graaff-Reinet - „ - - -	*C. J. Howlett.
Uitenhage - „ - - -	H. Fairey.

Egypt.—

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Botanist - - -	Prof. W. Lawrance Balls, M.A.
Assistant Botanist -	F. S. Holton.
Director of Horticulture.	*T. W. Brown.
Assistant Director -	——

Alexandria.—Horticultural Society :—

Secretary - - -	D. S. Fish.

Gold Coast.—Botanic and Agricultural Department :—

Director of Agriculture.	W. S. D. Tudhope.
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Curator - - -	*A. C. Miles.
„ - - -	C. Saunders.
„ - - -	M. D. Reece.
„ - - -	*A. R. Gould.
„ - - -	*T. Hunter.
Conservator of Forests -	N. C. McLeod.

Natal.—Botanic Gardens :—

Durban - -	Director - - -	John Medley Wood, A.L.S.
	Curator - - -	*James Wylie.

Nyasaland Protectorate.—

Agricultural and Forestry Department :—

Zomba - -	Director of Agriculture.	J. S. J. McCall.
	Agriculturist - -	*E. W. Davy.
	Chief Forest Officer -	*J. M. Purves.

Orange River Colony.—Department of Agriculture :—

Botanist - - -	E. J. MacMillan.
Chief of Forestry Division.	K. A. Carlson.

Rhodesia.—

Bulawayo.—Rhodes Matopos Park :—

Curator - - -	W. E. Dowsett.

Salisbury.—Department of Agriculture :—

Director - - -	E. A. Nobbs, Ph.D., B.Sc.
Agriculturist and Botanist.	H. G. Mundy, F.L.S.

Sierra Leone.—Agricultural Department :—

Director of Agriculture.	W. Hopkins.

Soudan.—

Khartoum -	Director of Woods and Forests.	——
	Superintendent of Palace Gardens.	*F. S. Sillitoe.
Jebelin - -	Superintendent of Experimental Plantations.	*T. Cartwright.

Southern Nigeria.—Agricultural Department :—

Director of Agriculture.	*W. H. Johnson, F.L.S.
Assistant Director -	——
Mycologist- - -	†C. O. Farquharson.
Superintendent of Agriculture.	S. V. Henderson.
Assistant Superintendent.	——
Curator - - -	*William Don.
,, - - -	*R. Gill.
,, - - -	*T. D. Maitland.
,, - - -	*A. B. Culham.
Conservator of Forests -	H. N. Thompson.

Transvaal.—Department of Agriculture :—

Pretoria - -	Botanist - - -	J. Burtt Davy, F.L.S.
	Mycologist - -	†I. B. Pole Evans, B.Sc., F.L.S.
	Conservator of Forests -	C. E. Legat.

Uganda.—

Entebbe—Agricultural Department :—

	Director of Agriculture.	P. H. Lamb.
	Assistant - - -	*J. D. Snowden.

Botanical, Forestry and Scientific Department :—

	Assistant - - -	*Robert Fyffe.

Zanzibar -	-	Director of Agriculture.	F. C. McClellan, F.L.S.

AUSTRALIA.

New South Wales.—Botanic Gardens :—

Sydney -	-	Director and Government Botanist.	J. H. Maiden, F.L.S.
		Superintendent -	George Harwood.
		Botanical Assistant -	E. Betche.

Technological Museum :—

	Curator - - -	R. T. Baker, F.L.S.
Chief Forest Officer	- - -	R. D. Hay.

Queensland.—

Brisbane -	-	Colonial Botanist -	F. M. Bailey, C.M.G., F.L.S.

Botanic Gardens :—

Director - - -	J. F. Bailey.

Acclimatisation Society's Gardens :—

Secretary - - -	H. J. Johnson.
Overseer - - -	James Mitchell.

Forest Department :—

Director - - -	*Philip MacMahon.

Cairns.—Kamerunga State Nursery :—

Manager - - -	Howard Newport.
Overseer - - -	C. E. Wood.

Rockhampton	-	Superintendent - -	R. Simmons.

South Australia.—Botanic Gardens :—

Adelaide -	-	Director - - -	Maurice Holtze, Ph.D., F.L.S.
Port Darwin	-	Curator - - -	Nicholas Holtze.

Woods and Forests :—

Conservator - -	Walter Gill, F.L.S.

Tasmania.—

Hobart - -	Government Botanist	Leonard Rodway.
	Chief Forests Officer -	J. C. Penny.
	Botanic Gardens :—	
	Officer-in-charge -	Robert Hall.

Victoria.—Botanic Gardens :—

Melbourne -	Curator - - -	J. Cronin.
	National Herbarium :—	
	Government Botanist-	A. J. Ewart, D.Sc., Ph.D., F.L.S.
	Conservator of Forests - - -	H. R. Mackay.

BERMUDA.

Botanic Station :—

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BRITISH HONDURAS.

Botanic Station :—

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CANADA.

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	Director of Government Experimental Farms.	——
	Director's Assistant and Superintendent of Botanic Garden.	W. T. Macoun.
	Botanist - - -	H. T. Güssow.
	Assistant Botanist -	H. Groh.
Montreal -	Professor of Botany, McGill University.	——

CEYLON.

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Curator	-	*Hugh F. Macmillan, F.L.S.
Superintendent of School Gardens	-	C. Drieberg, B.A.
Hakgala - Curator	-	*J. J. Nock.
Heneratgoda - Conductor	-	D. F. de S. Gunaratna.

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Nuwara Eliya - Curator	-	——
Conservator of Forests	-	T. J. Campbell.

CYPRUS.

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Director of Agriculture	-	——

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FIJI.

Superintendent of Agriculture	-	Charles H. Knowles.

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Curator	-	*Daniel Yeoward.

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Assistant Superintendent	-	*H. Green.

MALTA.

Argotti Botanic Garden :—

Director - - - - - -	Francesco Debono, M.D.

MAURITIUS.

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Assistant Director - - - -		P. de Sornay.
1st Assistant - - - - -		S. E. Pougnet.
2nd „ - - - - -		F. Bijoux.
Reduit - -	Overseer - - -	W. A. Kennedy.
Forest Officer - - - - -		F. Gleadow.

NEW ZEALAND.

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Biologist - - - -		T. W. Kirk.

State Forest Department :—

Chief Forester - - -		Henry John Matthews.

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Napier - -	„ - -	W. Barton.
Invercargill -	Head Gardener - -	——
Auckland -	Ranger - - -	William Goldie.
Christchurch -	Head Gardener - -	*Ambrose Taylor.

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STRAITS SETTLEMENTS.

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		„ „	*J. W. Anderson.

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Assistant Director -	†F. G. Spring.
Assistant Mycologist -	†C. K. Bancroft, B.A.
" "	†E. Bateson.
Economic Botanist -	——

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WEST INDIES.

Imperial Department of Agriculture :—

Barbados - -	Commissioner - -	Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.
	Scientific Assistant -	A. H. Kirby, B.A.
	Mycologist and Agricultural Lecturer.	†F. W. South, B.A.

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Agricultural Assistant	C. A. Gomes.

Barbados.—Department of Agriculture.

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Assistant Curator -	G. A. Jones.

Grenada.—Botanic Garden :—

Agricultural Superintendent.	G. G. Auchinleck, B.Sc.
Agricultural Instructor	G. F. Branch.

Montserrat.—Botanic Station :—

Curator - - -	*W. Robson.

St. Kitts-Nevis.—Botanic Station :—		
	Agricultural Superintendent.	F. R. Shepherd.
	Agricultural Instructor, Nevis.	J. O. Maloney.
St. Lucia.—Botanic Station :—		
	Agricultural Superintendent.	*John Chisnall Moore.
	Assistant Superintendent.	*A. J. Brooks.
	Agricultural Instructor	——
St. Vincent.—Botanic Station :—		
	Agricultural Superintendent.	*W. N. Sands.
	Agricultural Instructor.	G. Fraser.
	Agricultural School :—	
	Officer in Charge	*W. H. Patterson.
Virgin Islands.—		
	Agricultural Instructor.	*W. C. Fishlock.

Bahamas.—Botanic Station :—		
	Curator	W. M. Cunningham.
British Guiana.—Department of Science and Agriculture :—		
Georgetown	Director	Prof. J. B. Harrison, C.M.G., M.A., F.I.C., F.C.S.
	Assistant Director and Government Botanist.	F. A. Stockdale, B.A., F.L.S.
	Forestry Officer	C. W. Anderson.
	Head Gardener	†John F. Waby, F.L.S.
	Assistant Gardener	F. Greeves.
	Agricultural Superintendent.	*Robert Ward.
Jamaica.—Department of Agriculture :—		
	Director	Hon. H. H. Cousins, M.A., F.C.S.
	Travelling Instructor	*William Cradwick.
	„ „	James Briscoe.
Hope Gardens and Experiment Station, Hill, Parade, and Castleton Gardens.	Superintendent	*William Harris, F.L.S.
King's House Garden.	„	*William J. Thompson.

Tobago.—Botanic Station :—

Curator - - - - -	*W. E. Broadway.
Agricultural Instructor - -	W. E. Augustus.

Trinidad.—Department of Agriculture :—

Director - - -	Prof. P. Carmody, F.I.C., F.C.S.
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Mycologist - -	J. B. Rorer, M.A.
Curator, Royal Botanic Gardens.	*F. Evans.
Forest Officer - - -	C. S. Rogers.

INDIA.

Botanical Survey of India :—

Director - - - - -	Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Reporter on Economic Products -	*I. H. Burkill, M.A., F.L.S.
Assistant for Phanerogamic Botany	S. C. Banerji, M.A., B.Sc.
,, ,, ,,	M. S. Ramaswami, B.A.

Departments of Agriculture, Botanical Officers attached to :—

Imperial Agricultural Research Institute, Pusa, Bengal :—

Mycologist - - - -	†E. J. Butler, M.B., F.L.S.
Economic Botanist - -	A. Howard, M.A., F.L.S.
Supernumerary Botanist -	†E. Holmes Smith.

Bengal Agricultural Department, Calcutta :—

Economic Botanist - -	E. J. Woodhouse, B.A., F.L.S.

Bombay Agricultural College, Poona :—

Economic Botanist - -	†W. Burns, B.Sc.

Central Provinces Agricultural Department, Nagpur :—

Economic Botanist - -	†R. J. D. Graham, M.A., B.Sc.

Departments of Agriculture, Botanical Officers attached to—*continued.*

Madras Agricultural Department :—

Government Botanist	†C. A. Barber, M.A., Sc.D., F.L.S.
Mycologist	†W. McRae, M.A., B.Sc.

Punjab Agricultural Department, Lyallpur :—

Economic Botanist	†D. Milne, B.Sc.

Agricultural College, Cawnpur, United Provinces :—

Economic Botanist	†H. M. Leake, M.A., F.L.S.

Eastern Bengal and Assam Agricultural Department :—

Economic Botanist	P. G. Hector, B.Sc.

BENGAL.

Calcutta.—Royal Botanic Garden, Sibpur :—

Superintendent	Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Curator of Herbarium	†W. W. Smith, M.A.
Curator of Garden	*G. T. Lane.
Assistant Curator	*E. S. Dodd.
Overseer	A. G. Laurence.
Probationer	*H. Dodd.

Gardens in Calcutta :—

Assistant Curator	*J. T. Johnson.
Overseer	S. N. Bose.

Agri-Horticultural Society of India :—

Secretary	F. Abbott.
Superintendent	P. Lancaster.

Darjeeling.—Lloyd Botanic Garden :—

Superintendent	Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Curator	*G. H. Cave.

Cinchona Department.—

Superintendent of Cinchona Cultivation.	Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.

Mungpoo Plantation :—

Manager	*P. T. Russell.
Overseer	W. Cousins.

Munsong Plantation :—

Manager	*J. Parkes.
Assistant Manager	*H. F. Green.
,, ,,	*H. Thomas.
Overseer	G. Holl.

BOMBAY.

Bombay City.—Municipal Garden :—

Superintendent - - - - C. D. Mahaluxmivala.

Ghorpuri.—Botanic Garden :—

Superintendent - - - - P. G. Kanetkar.

Poona.—Government Gardens :—

Superintendent - - - - *E. Little.

CENTRAL PROVINCES.

Nagpur.—Public Gardens :—

Superintendent - - - - *J. E. Leslie.

MADRAS.

Madras City.—Agri-Horticultural Society :—

Hon. Secretary - - - - P. F. Fyson, B.A., F.L.S.
Superintendent - - - - H. E. Houghton, F.L.S.

Ootacamund.—Government Gardens and Parks :—

Curator - - - - - *F. H. Butcher.

Cinchona Department.—

Director of Cinchona Plantations - W. M. Standen.
Superintendent, Dodabetta Plantation. - H. V. Ryan.
Superintendent, Nedivattam and Hooker Plantations. - E. Collins.

PUNJAB.

Delhi.—Historic and other Gardens :—

Superintendent - - - - *R. H. Locke.

Lahore.—Government Gardens :—

Superintendent - - - - *A. Hardie.

Agri-Horticultural Gardens :—

Superintendent - - - - *W. R. Mustoe.

Simla.—Vice-regal Estate Gardens :—

Superintendent - - - *Ernest Long.

NORTH-WEST FRONTIER PROVINCE.

Agri-Horticulturist - - - W. R. Brown.

UNITED PROVINCES OF AGRA AND OUDH.

Agra.—Taj and other Gardens :—
Superintendent - - - - *A. E. P. Griessen.

Allahabad.—Government Gardens :—
Superintendent - - - - *W. Head.

Cawnpur.—Memorial and other Gardens :—
Superintendent - - - - *R. Badgery.

Kumaon.—Government Gardens :—
Superintendent - - - - *Norman Gill, F.L.S

Lucknow.—Horticultural Gardens :—
Superintendent - - - - *H. J. Davies.
Probationer - - - - *E. E. Mawer.

Saharanpur.—Government Botanic Gardens :—
Superintendent - - - - *A. C. Hartless.

Dehra Dun.—Imperial Forest Research Institute :—
Imperial Forest Botanist - - R. S. Hole, F.L.S.

EASTERN BENGAL AND ASSAM.

Dacca (Ramna).—Arboricultural Expert. *R. L. Proudlock.

NATIVE STATES.

Mysore (Bangalore) :—
Economic Botanist - - - *G. H. Krumbiegel.

Baroda :—
Superintendent - - - - *B. Cavanagh.

Travancore (Trivandrum) :—
Director - - - - Major F. W. Dawson.

Udaipur :—
Superintendent - - - - T. H. Storey.